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CALIFORNIA STATE MINING BUREAU

FERRY BUILDING, SAN FRANCISCO

E. McN. HAMILTON

State Mineralogist

San Francisco]

BULLETIN No. 68

[October, 1914

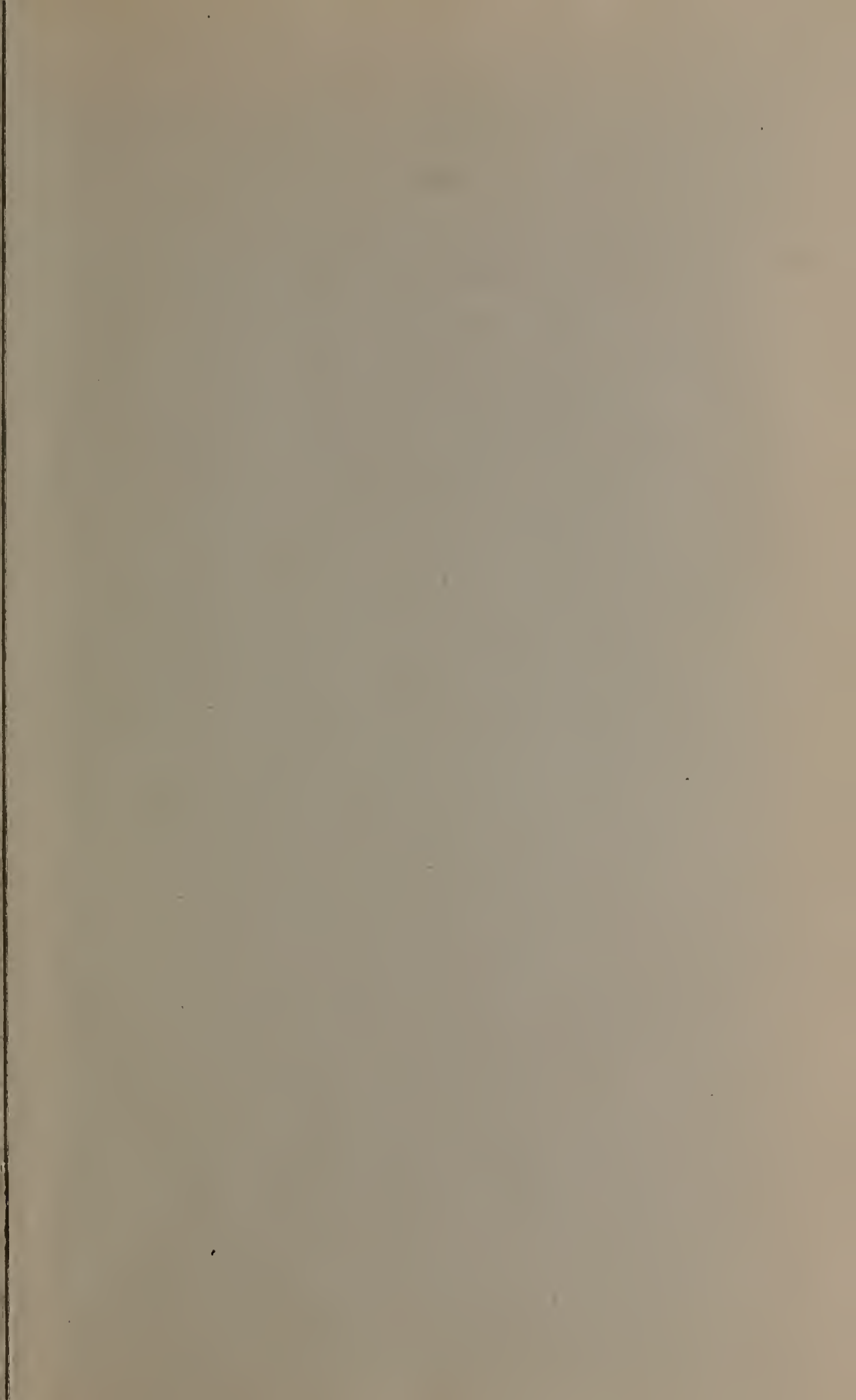
Mineral Production for 1913



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Mineral Production for 1913

By E. S. BOALICH, Statistician

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LETTER OF INTRODUCTION.

The Bulletin herewith presented to the mineral industry is the result of a painstaking effort to so compile the statistics of mineral production that they will be of actual use to producers and those interested in the consumption of the mineral products of our State.

The compilation of accurate and dependable figures is an extremely difficult undertaking, and the State Mineralogist takes the opportunity of here expressing his appreciation of the universal co-operation of the producers in making this work possible.

It is the evidence herein put forth that should make us realize the magnitude of our latent mineral resources in this State. The production for the year 1913 of more than one hundred million dollars shows an increase of ten million dollars over that of the preceding year. Coupled with this is the fact that twenty millions of dollars was distributed in dividends, resulting from this basic production.

This progress is being made despite the fact that some branches of the industry have been held back by various uneconomic conditions and their production is unnecessarily curtailed. Such problems as present themselves in the separate branches of the industry affect all the others and should be taken care of by the industry as a whole. It is greatly to be deplored that there is no concerted action of the mineral producers at the present time.

In analyzing and discussing the situation with many of those interested in the great mineral industry in the State, a plan has been conceived to form an organization to further and foster its development. It is to be hoped that in the near future this plan will be brought to a successful culmination. It is conceded that such an organization would be of great service to the mineral industry and aid immeasurably in its advancement. When the call comes it is earnestly hoped that each and every person interested will respond and take active part.

F. McN. HAMILTON,
State Mineralogist.



MINERAL INDUSTRY, CALIFORNIA, 1913

Data Compiled from Direct Returns from Producers in Answer to
Inquiries sent out by California State Mining Bureau,
Ferry Building, San Francisco, California.

CHAPTER ONE.

The mineral production of California during the calendar year 1913 was valued at \$98,644,639.00, as compared with the 1912 output, worth \$88,972,385.00, an increase of \$9,672,254.00. These figures, so far as it has been possible to make them, refer to the value AT THE PROPERTY, of CRUDE MINERAL SUBSTANCES. Duplication of figures has been studiously avoided. Approximate production of refined asphalt has been given on another page because that item is so generally included in considering the subject of mineral production. The above mentioned 1913 total does not include value of asphalt, however, neither does it consider limestone which has gone toward the manufacture of cement, nor clay which has been molded into bricks. Where it is impossible to get a figure for the ingredients of a manufactured mineral substance, as in the case of cement and brick, these products are of necessity included. In practically every other instance the value given represents the closest possible approximation for the crude material as it came from the mine, quarry or well. It is almost impossible to exaggerate the magnitude and the importance of the mineral industry in California. The early history of mining in California is the history of the State. With the advancement of other lines of effort, and with the transition of the mineral industry from a romantic nugget-hunting sport to a solid, well defined, dividend paying business, public interest has been diverted to some extent. Nevertheless, this industry is advancing with gigantic strides. California is today the leading State in the Union in its production of petroleum, gold, borax, quicksilver, magnesite, and platinum. In the total value of her mineral products California leads all states west of the Mississippi River.

Every county in the State contains mineral deposits of some description, and during 1913 fifty-six of the fifty-eight counties reported a commercial output, from Kern, with a total value of \$28,406,193, to Alpine, with its total of \$541.

Twenty-one counties produced minerals to a value exceeding \$1,000,000 during the year, and forty-three passed the \$100,000 mark.

Petroleum output was worth \$48,578,014 and stands first on the list by many millions of dollars. Gold, with the greatest annual production since 1883, comes second, amounting to \$20,406,958. Cement is

third, the output being worth \$7,743,024. The stone industry, including granite and crushed rock used for all purposes, ranks fourth, valued at \$6,168,020. Copper is fifth, worth \$5,343,023. Then in the order named—Brick, \$2,915,350; Borax, \$1,491,530; Natural Gas, \$1,053,292.

With the ever expanding uses for petroleum and its refined products the growth of this branch of the mineral industry bids fair to continue indefinitely in the future.

Increased efficiency in mining and reduction methods in late years has more than offset the gradual decline in values in the larger gold mines, and new and paying properties are constantly being added to the list of active producers. While the zenith of gold production has possibly passed in California, such is not the case in the instance of any other metal or mineral substance.

Many copper deposits await transportation and other facilities, or a satisfactory solution of the much discussed "fume" question, to place them on a paying basis. The same conditions in a general way hold true in the case of iron, lead, zinc and other metalliferous deposits; of the mountains of granite, limestone, and marble; of the millions of acres of ancient lake beds containing nitre, potash, salt and soda; and of practically every separate item on the entire list.

Production of many of the industrial materials is small owing to a present lack of demand, as well as facilities for handling. This condition is annually improving with the growth of California in population and with the rapidly increasing importance of the Pacific coast as a manufacturing and trade center.

The following table shows the yield of mineral substances of California for 1913 as compiled from the returns received at the State Mining Bureau, San Francisco, in answer to inquiries sent to producers:

Substance	Amount	Value
Asbestos -----	47 tons	\$1,175 00
Barytes -----	1,600 tons	3,680 00
Bituminous rock -----	37,541 tons	78,479 00
Borax -----	58,051 tons	1,491,530 00
Brick -----	358,754 M	2,915,350 00
Cement -----	6,167,806 bbls.	7,743,024 00
Chromite -----	1,180 tons	12,700 00
Clay -----	231,179 tons	261,273 00
Coal -----	25,198 tons	85,809 00
Copper -----	34,471,118 lbs.	5,343,023 00
Feldspar -----	2,129 tons	7,850 00
Fuller's earth -----	460 tons	3,700 00
Gems -----		13,740 00
Gold -----		20,406,958 00
Graphite -----	2,500 lbs.	25 00
Gypsum -----	47,100 tons	135,050 00
Infusorial earth -----	8,645 tons	35,968 00
Iron ore -----	2,343 tons	4,485 00
Lead -----	3,640,951 lbs.	160,202 00
Lime -----	613,444 bbls.	528,547 00
Limestone -----	301,918 tons	274,455 00
Magnesite -----	9,632 tons	77,056 00
Marble -----	41,654 cu. ft.	113,282 00
Mineral paint -----	303 tons	1,780 00
Mineral water -----	2,350,792 gals.	599,748 00
Natural gas -----	14,210,836 M cu. ft.	1,053,292 00
Petroleum -----	94,494,532 bbls.	48,578,014 00
Platinum -----	368 oz.	17,738 00
Pumice -----		4,500 00
Pyrites -----	79,000 tons	218,537 00
Quartz rock -----	4,040 tons	7,756 00
Quicksilver -----	15,661 flasks	630,042 00
Salt -----	204,407 tons	462,681 00
Sand, glass -----	14,578 tons	14,143 00
Sandstone -----	62,227 cu. ft.	27,870 00
Silver -----		832,553 00
Soapstone -----	1,350 tons	6,150 00
Soda -----	1,861 tons	24,936 00
Stone industry* -----		6,168,020 00
Tungsten ore -----	7,592 tons	234,673 00
Zinc -----	1,157,947 lbs.	64,845 00
Total -----		\$98,644,639 00

*Including granite, macadam, rubble, paving blocks, sand, and gravel.

The following table shows the comparative value of minerals produced in California during the years 1912 and 1913:

Substance	1912	1913
Asbestos -----	\$2,700 00	\$1,175 00
Barytes -----	2,812 00	3,680 00
Bituminous rock -----	87,467 00	78,479 00
Borax -----	1,122,713 00	1,491,530 00
Brick -----	2,940,290 00	2,915,350 00
Cement -----	6,074,661 00	7,743,024 00
Chromite -----	11,260 00	12,700 00
Clay -----	215,683 00	261,273 00
Coal -----	39,092 00	85,809 00
Copper -----	5,638,049 00	5,343,023 00
Feldspar -----	6,180 00	7,850 00
Fuller's earth -----	6,500 00	3,700 00
Gems -----	23,050 00	13,740 00
Gold -----	19,713,478 00	20,406,958 00
Graphite -----		25 00
Gypsum -----	117,388 00	135,050 00
Infusorial earth -----	17,074 00	35,968 00
Iron ore -----	2,508 00	4,485 00
Lead -----	61,653 00	160,202 00
Lime -----	464,440 00	528,547 00
Limestone -----	570,248 00	274,455 00
Magnesite -----	105,120 00	77,056 00
Manganese -----	400 00	
Marble -----	74,120 00	113,282 00
Mineral paint -----	1,800 00	1,780 00
Mineral water -----	529,384 00	599,748 00
Natural gas -----	940,076 00	1,053,292 00
Petroleum -----	41,868,344 00	48,578,014 00
Platinum -----	19,731 00	17,738 00
Pumice -----	2,500 00	4,500 00
Pyrites -----	203,470 00	218,537 00
Quartz rock -----		7,756 00
Quicksilver -----	866,024 00	630,042 00
Salt -----	383,370 00	462,681 00
Sand-glass -----	15,404 00	14,143 00
Sandstone -----	22,574 00	27,870 00
Silver -----	799,584 00	832,553 00
Soapstone -----	7,350 00	6,150 00
Soda -----	37,094 00	24,936 00
Stone industry* -----	5,473,928 00	6,168,020 00
Tungsten ore -----	206,000 00	234,673 00
Zinc -----	298,866 00	64,845 00
Totals -----	\$88,972,385 00	\$98,644,639 00
Asphalt -----	2,500,000 00	2,752,000 00
Total, including asphalt -----	\$91,472,385 00	\$101,396,639 00

*Including granite, macadam, rubble, paving blocks, sand, and gravel.

The following table shows the comparative value of the mineral production of the various counties in the State for the years 1912 and 1913:

County	1912	1913
Alameda	\$794,961 00	\$844,217 00
Alpine*	*	541 00
Amador	2,925,202 00	3,013,180 00
Butte	2,403,675 00	2,533,940 00
Calaveras	2,051,781 00	2,042,901 00
Colusa	70,165 00	48,481 00
Contra Costa	829,811 00	1,962,640 00
Del Norte	3,950 00	2,514 00
El Dorado	122,001 00	67,723 00
Fresno	8,897,685 00	8,438,810 00
Glenn	32,950 00	27,776 00
Humboldt	268,116 00	471,052 00
Imperial	30,000 00	95,054 00
Inyo	483,330 00	1,942,309 00
Kern	23,097,003 00	28,406,193 00
Kings	1,850 00	1,335 00
Lake	123,286 00	125,829 00
Lassen		2,382 00
Los Angeles	5,594,513 00	5,833,298 00
Madera	112,285 00	371,867 00
Marin	122,200 00	278,453 00
Mariposa	214,294 00	246,079 00
Mendocino	300 00	9,450 00
Merced	45,000 00	35,329 00
Modoc	29,187 00	6,875 00
Mono	454,268 00	184,428 00
Monterey	132,749 00	178,679 00
Napa	266,708 00	1,186,353 00
Nevada	2,108,543 00	2,950,367 00
Orange	4,518,275 00	6,948,495 00
Placer	881,537 00	520,808 00
Plumas	196,997 00	143,698 00
Riverside	782,627 00	2,071,969 00
Sacramento	2,171,399 00	2,925,706 00
San Benito	494,068 00	514,995 00
San Bernardino	1,428,057 00	2,486,100 00
San Diego	305,683 00	315,694 00
San Francisco	151,147 00	110,551 00
San Joaquin	210,040 00	165,157 00
San Luis Obispo	31,564 00	63,675 00
San Mateo	216,582 00	215,371 00
Santa Barbara	4,111,258 00	3,636,288 00
Santa Clara	557,585 00	311,383 00
Santa Cruz	270,207 00	1,816,805 00
Shasta	5,825,819 00	6,212,344 00
Sierra	736,423 00	1,010,976 00
Siskiyou	598,713 00	309,986 00
Solano	203,073 00	1,839,721 00
Sonoma	346,306 00	239,037 00
Stanislaus	295,673 00	272,249 00
Tehama	1,300 00	2,442 00
Trinity	733,755 00	435,142 00
Tulare	142,890 00	119,760 00
Tuolumne	1,353,706 00	1,198,383 00
Ventura	595,399 00	924,972 00
Yuba	2,775,132 00	2,507,139 00
Unapportioned	7,821,357 00	17,738 00
Totals	\$88,972,385 00	\$93,644,639 00

*Alpine included in Stanislaus.

CHAPTER TWO.

FUELS.

(Hydrocarbons.)

The above subdivision of the mineral products of California includes coal, natural gas and petroleum.

The combined value of these three substances equals approximately one half of the value of the entire mineral industry in the State. As will be noted in the following table, an increase was recorded in each item and in the case of petroleum this gain over the previous year amounted to the stupendous total of \$6,709,670.

Natural gas is plentiful, especially in the oil fields of the State, and the amount commercially utilized shows a healthy increase over that of 1912. Coal of the best quality has never been discovered in California and the introduction of crude oil as a competitive fuel has caused a great drop in the coal output of the State. For many years previous to the development of the oil fields the annual value of coal produced was several times the figure shown here. The increase for 1913 over 1912 is perhaps a temporary condition and may not continue to hold.

Value of fuels produced in California during 1912 and 1913 with increase in each instance is tabulated herewith:

Substance	1913	1912	Increase
Coal -----	\$85,809 00	\$39,092 00	\$46,717 00
Natural gas -----	1,053,292 00	940,076 00	113,216 00
Petroleum -----	48,578,014 00	41,868,344 00	6,709,670 00
Totals -----	\$49,717,115 00	\$42,847,512 00	\$6,869,603 00

Coal.

Reference: State Mineralogist Reports VII, XII, XIII.

Deposits of coal, developed and undeveloped, are known in twenty-five counties of California. In practically all cases the material is of inferior value. Much of the product should be classed as lignite. Even so, coal was an important factor in the mineral industry of the State from the time of its discovery in 1861 down to a few years ago when it was largely supplanted by crude oil.

During 1913 four properties, located in Amador, Contra Costa, Monterey, and Siskiyou counties, produced 25,198 tons of coal valued at \$85,809. This is an increase, both in amount and value, over the 1912 output of 14,848 tons worth \$39,092. Seventy-eight men were employed in the above mentioned mines. Previous to 1887 no exact

production figures are available, although the Mount Diablo district alone produced many hundreds of thousands of tons of coal between 1860 and 1887. The record of the State's output, with annual figures for amount and value, is shown below from 1887 to date:

Year	Amount, tons	Value	Year	Amount, tons	Value
1887 -----	50,000	\$150,000 00	1902 -----	88,460	\$248,622 00
1888 -----	95,000	380,000 00	1903 -----	93,026	265,383 00
1889 -----	121,280	288,232 00	1904 -----	79,062	376,494 00
1890 -----	110,711	283,019 00	1905 -----	46,500	144,500 00
1891 -----	93,301	204,902 00	1906 -----	24,850	61,600 00
1892 -----	85,178	209,711 00	1907 -----	23,734	55,849 00
1893 -----	72,603	167,555 00	1908 -----	18,496	55,503 00
1894 -----	59,887	139,862 00	1909 -----	49,389	216,913 00
1895 -----	79,858	193,790 00	1910 -----	11,033	23,484 00
1896 -----	70,649	161,335 00	1911 -----	11,047	18,297 00
1897 -----	87,449	196,255 00	1912 -----	14,484	39,092 00
1898 -----	143,045	337,475 00	1913 -----	25,198	85,809 00
1899 -----	160,941	420,109 00			
1900 -----	176,956	535,531 00			
1901 -----	150,724	401,772 00			
			Totals -----	2,042,861	\$5,661,094 00

Natural Gas.

Reference: State Mineralogist Reports VII, X, XII. Bulletins 3 and 13.

Data regarding natural gas production in California are difficult to compile accurately. An untold amount is annually wasted, although during the past few years attempts have been made to conserve this valuable natural resource. As near as can be estimated 14,210,836 M cubic feet of gas were commercially used, for lighting, heat, as a fuel and for all industrial purposes, having a total value of \$1,053,292. In numerous cases the producers merely give value of the gas consumed, having made no effort to measure it in any way. In such instances amounts have been estimated, taking as a basis the general average value for the particular district in question. Even the value is often-times an estimate. The total, however, would be doubled many times if all the available gas were made to serve a useful purpose. One of the recent uses for natural gas is in the manufacture of gasoline from this source.

Distribution by county is as follows:

County	Amount, M.	Value	Average value per M.
Fresno -----	236,100	\$23,610 00	at 10 cents
Humboldt -----		150 00	-----
Kern -----	7,111,237	568,899 00	at 8 cents
Kings -----	1,916	575 00	at 30 cents
Los Angeles -----	1,287,794	77,578 00	at 6 cents
Orange -----	192,240	9,612 00	at 5 cents
Sacramento -----	72,000	36,000 00	at 50 cents
San Joaquin -----	142,730	67,967 00	at 47 cents
Santa Barbara -----	5,096,300	254,815 00	at 5 cents
Santa Clara -----	2,000	500 00	-----
Solano -----	6,319	7,366 00	-----
Ventura -----	62,200	6,220 00	at 10 cents
Totals -----	14,210,836	\$1,053,292 00	

Total annual value of natural gas produced in California, as shown by the records of the State Mining Bureau, is as follows:

Year	Value	Year	Value
1888 -----	\$10,000 00	1902 -----	\$99,443 00
1889 -----	12,680 00	1903 -----	74,237 00
1890 -----	33,000 00	1904 -----	91,035 00
1891 -----	30,000 00	1905 -----	102,479 00
1892 -----	55,000 00	1906 -----	109,489 00
1893 -----	68,500 00	1907 -----	114,759 00
1894 -----	79,072 00	1908 -----	474,584 00
1895 -----	112,000 00	1909 -----	616,932 00
1896 -----	111,457 00	1910 -----	1,676,367 00
1897 -----	62,657 00	1911 -----	491,859 00
1898 -----	74,424 00	1912 -----	940,076 00
1899 -----	95,000 00	1913 -----	1,053,292 00
1900 -----	34,578 00		
1901 -----	92,034 00	Total -----	\$6,714,954 00

Petroleum.

Reference: Bulletins 3, 11, 16, 19, 31, 32, 63. State Mineralogist Reports IV, X, XII, XIII.

Petroleum production in California during 1913 amounted to 98,494,532 barrels valued at \$48,578,014, or an average of 49.3 cents per barrel, as compared with the 1912 output of 89,689,250 barrels worth \$41,868,344, or an average of 46.7 cents per barrel. This is an increase in amount of 8,805,282 barrels, and in value of \$6,709,670, and in the average price per barrel of 2.6 cents.

Of the total amount produced 5,129,049 barrels were used as fuel in the field as compared with 6,050,186 in 1912. This item is slowly decreasing on account of the growing use of electric power in the various fields.

As will be noted in the tabulated county returns, the greatest actual increase of production occurred in Kern County, although Orange County leads all others in its per cent increase. Fresno, Los Angeles, and Santa Barbara counties all reported a slight decrease in crude oil output. Ventura, while a comparatively small producer, gained over 30 per cent in number of barrels marketed as compared with the previous year. No active production was recorded in San Luis Obispo County during the year 1913. Of the State's total output for the year 59,841,592 barrels, or 60.8 per cent, were of a gravity exceeding 18 degrees Baumé.

In the face of an unexampled increase in production the average price per barrel actually received by producers made a marked advance, and the condition of the industry may be roughly ascertained when it is known that aside from money paid as royalty and used in development and purchase of additional properties, etc., between fifteen and sixteen million dollars was paid to stockholders in the form of dividends. In other words, over 30 per cent of the actual value of the crude oil at the wells reached the hands of buyers of oil stock, as interest on their investment, during the year 1913.

The following tabulation shows the comparative petroleum production by counties for the years 1912-1913, with increase (+) or decrease (—) in value, in each instance:

County	1912		1913		+ plus or — minus
	Amount, bbls.	Value	Amount, bbls.	Value	
Fresno -----	19,510,932	\$8,487,255	18,956,965	\$7,927,736	\$559,519—
Kern -----	51,448,067	21,762,532	58,698,432	27,038,474	5,275,942+
Los Angeles -----	4,484,590	2,798,384	4,143,690	2,672,680	125,704—
Orange -----	6,704,421	4,478,553	9,485,362	6,867,402	2,388,849+
San Luis Obispo -----	2,129	1,469	-----	-----	1,469—
Santa Barbara -----	6,862,719	3,747,045	6,291,076	3,151,725	595,320—
Santa Clara -----	14,092	8,295	20,000	12,000	3,705+
Ventura -----	662,300	584,811	899,007	907,997	323,186+
Totals -----	89,689,250	\$41,868,344	98,494,532	\$48,578,014	\$6,709,670+

Average price per barrel of petroleum in the various producing counties during 1912 and 1913 were as follows:

County	Average price per barrel		Increase (+) or decrease (—)
	1912	1913	
Fresno -----	43.5 cents	41.8 cents	—1.7 cents
Kern -----	42.3 cents	46.0 cents	+3.7 cents
Los Angeles -----	62.4 cents	64.5 cents	+2.1 cents
Orange -----	66.8 cents	72.4 cents	+5.6 cents
Santa Barbara -----	56.4 cents	50.0 cents	—6.4 cents
Ventura -----	88.3 cents	\$1.01	+12.7 cents
State as a whole -----	46.7 cents	49.3 cents	+2.6 cents

The gravity of the crude oil produced varies greatly. The following table shows the ratio above and below 18 degrees Baumé, with the average price received per barrel for the two general grades of oil in each county, for 1913:

County	Per cent above 18 degrees	Average price per barrel	Per cent below 18 degrees	Average price per barrel
Fresno -----	45%	50.8 cents	55%	35.5 cents
Kern -----	59%	53.4 cents	41%	36.1 cents
Los Angeles -----	42%	73.5 cents	58%	57.4 cents
Orange -----	88%	75.5 cents	12%	50.6 cents
Santa Barbara -----	86%	56.0 cents	14%	37.9 cents
Ventura -----	92%	\$1.06	8%	46.0 cents

The annual petroleum production, in barrels, since the inception of the industry in California follows, with the amount credited to the year 1875 representing total production up to, and including, that date.

Year	Barrels	Year	Barrels
1875 -----	175,000	1896 -----	1,257,780
1876 -----	12,000	1897 -----	1,911,569
1877 -----	13,000	1898 -----	2,249,088
1878 -----	15,227	1899 -----	2,677,875
1879 -----	19,858	1900 -----	4,329,950
1880 -----	40,552	1901 -----	7,710,315
1881 -----	99,862	1902 -----	14,356,910
1882 -----	128,636	1903 -----	24,340,839
1883 -----	142,857	1904 -----	29,736,003
1884 -----	262,000	1905 -----	34,275,701
1885 -----	325,000	1906 -----	32,624,000
1886 -----	377,145	1907 -----	40,311,171
1887 -----	678,572	1908 -----	48,306,910
1888 -----	690,333	1909 -----	58,191,723
1889 -----	303,220	1910 -----	77,697,568
1890 -----	307,360	1911 -----	84,648,157
1891 -----	323,600	1912 -----	89,689,250
1892 -----	385,049	1913 -----	98,494,532
1893 -----	470,179		
1894 -----	783,078		
1895 -----	1,245,339	Total (barrels) -----	659,607,208

The value of the crude oil output during the early years of its production is a difficult quantity at which to arrive accurately. Taking the total value given in Bulletin No. 60, which includes the years 1887-1909, as a basis, the grand total value of the petroleum produced in California during the past twenty-five years is as follows:

Year	Value
1887-1909 -----	\$136,693,228 00
1910 -----	37,689,542 00
1911 -----	40,552,088 00
1912 -----	41,868,344 00
1913 -----	48,578,014 00
Total -----	\$305,381,216 00

CHAPTER THREE.

METALS.

California's production of metals for the year 1913 reached a total value of \$27,694,519.00, and included copper, gold, iron, lead, platinum, quicksilver, silver, tungsten and zinc. Deposits of ores of antimony, molybdenum and vanadium are also to be found in the State, although there is no commercial output of these materials at the present time.

California leads all states in the Union in her gold production and the precious metal is widely distributed throughout the State. Thirty-two of the fifty-eight counties contain actively operated gold mines.

Copper, which is second in importance among the metals of the State, occurs in the following general districts: the Shasta County belt, which is by far the most important; the Coast Range deposits, extending more or less continuously from Del Norte in the north to San Luis Obispo County in the south; the Sierra Nevada foothill belt, starting in Plumas and running in a general southerly direction through the Mother Lode counties and ending in Kern; the eastern belt in Mono and Inyo counties; and the southern belt, in San Bernardino, Riverside, and San Diego counties.

Silver is not generally found alone in the State, but is almost invariably associated to a greater or less extent with gold, copper and lead. Quicksilver, while comparatively small in the value of its annual output, has for many years been one of the State's staple products and California supplies about 80 per cent of the Nation's output of this metal.

Tungsten likewise is found in but few other localities.

Immense deposits of iron ore have long been known in many sections of the State, but for various economic reasons this branch of the mineral industry is still in its infancy here.

The following tabulation shows production of metals in California during the years 1912-1913 with increase or decrease in value for each item:

Metal	1912		1913		Increase + or decrease —
	Amount	Value	Amount	Value	
Copper -----	34,169,997 lbs.	\$5,638,049	34,471,118 lbs.	\$5,343,023	—\$295,026
Gold -----		19,713,478		20,406,958	+ 693,480
Iron ore -----	2,508 tons	2,508	2,343 tons	4,485	+ 1,977
Lead -----	1,370,067 lbs.	61,653	3,640,951 lbs.	160,202	+ 98,549
Platinum -----	603 oz.	19,731	368 oz.	17,738	— 1,993
Quicksilver --	20,600 flasks	866,024	15,661 flasks	630,042	— 235,982
Silver -----		799,584		832,553	+ 32,969
Tungsten ore	8,042 tons	206,000	7,592 tons	234,673	+ 28,673
Zinc -----	4,331,391 lbs.	298,866	1,157,947 lbs.	64,845	— 234,021
Totals -----		\$27,605,893		\$27,694,519	+ 88,626

Antimony.

Reference: Bulletin 38. State Mineralogist Reports XII, XIII.

Many first-class deposits of antimony ore are known in California, the chief ones being located in Inyo, Kern, Mono, Riverside, San Benito, and Santa Clara counties. Metallic antimony has been found in Kern County, but the commonest occurrence is in the form of the sulphide. Mining of the ore has not been profitable in the State for some years because of the low price of the metal and the distance from a large market.

During the year 1887-1901 various small lots of antimony ore were mined and sold, amount and value being shown in the following table:

Year	Amount	Value
1887 -----	75 tons	\$15,500 00
1888 -----	100 tons	20,000 00
1893 -----	50 tons	2,250 00
1894 -----	150 tons	6,000 00
1895 -----	33 tons	1,485 00
1896 -----	17 tons	2,320 00
1897 -----	20 tons	3,500 00
1898 -----	40 tons	1,200 00
1899 -----	75 tons	13,500 00
1900 -----	70 tons	5,700 00
1901 -----	50 tons	8,350 00
Totals -----	680 tons	\$79,805 00

Copper.

Reference: Bulletins 23 and 50. State Mineralogist Reports VII, XIII.

During the calendar year 1913 sixty-three producers in California marketed 34,471,118 pounds of copper having a total value of \$5,343,023, or an average of 15½ cents per pound, as compared with the 1912 production of 34,169,997 pounds, worth \$5,638,049 at the average price for the year of 16½ cents per pound.

The drop of one cent per pound in the price of the metal caused a considerable decrease in the total value of the copper produced during the year in spite of the fact that there was a slight increase in the total output.

Further efforts have been made during the past year in the improvement of methods of handling the smelter smoke and, generally speaking, the agricultural communities in the neighborhood of several of the large smelters seem to be satisfied, but many plants in the State remain closed, and copper production remains far below normal, as has been the case for the past three years.

Seventeen counties contributed to the total, as shown in the table below, but more than two-thirds of the entire amount came from Shasta County, where the most extensive copper deposits of the State are located. San Bernardino County reported the largest number of individual producers—twenty-one in all—but they are in the main small shippers. Six counties produced in 1913 which had no copper output during the previous year, namely—El Dorado, Humboldt, Kern, Lassen, Merced, and Tuolumne.

Distribution by county for the year 1913 follows:

County	Amount	Value
Amador -----	19,023 lbs.	\$2,949 00
Calaveras -----	5,063,187 lbs.	784,794 00
El Dorado -----	693 lbs.	107 00
Humboldt -----	7,750 lbs.	1,201 00
Inyo -----	113,860 lbs.	17,648 00
Kern -----	3,498 lbs.	542 00
Lassen -----	2,259 lbs.	350 00
Madera -----	532,403 lbs.	82,522 00
Mariposa -----	416,031 lbs.	64,485 00
Merced -----	19,240 lbs.	2,982 00
Mono -----	79,319 lbs.	12,294 00
Placer -----	429 lbs.	67 00
Plumas -----	17,274 lbs.	2,678 00
Riverside -----	8,971 lbs.	1,391 00
San Bernardino -----	497,852 lbs.	77,167 00
Shasta -----	27,688,436 lbs.	4,291,708 00
Tuolumne -----	893 lbs.	138 00
Totals -----	34,471,118 lbs.	\$5,343,023 00

Amount and value of copper production in California annually since such records have been compiled by the State Mining Bureau is given in the following tabulation:

Year	Amount	Value
1887 -----	1,600,000 lbs.	\$192,000 00
1888 -----	1,570,021 lbs.	235,303 00
1889 -----	151,505 lbs.	18,180 00
1890 -----	23,347 lbs.	3,502 00
1891 -----	3,397,455 lbs.	424,675 00
1892 -----	2,980,944 lbs.	342,808 00
1893 -----	239,682 lbs.	21,571 00
1894 -----	738,594 lbs.	72,486 00
1895 -----	225,650 lbs.	21,901 00
1896 -----	1,992,844 lbs.	199,519 00
1897 -----	13,638,626 lbs.	1,540,666 00
1898 -----	21,543,229 lbs.	2,475,168 00
1899 -----	23,915,486 lbs.	3,990,534 00
1900 -----	29,515,512 lbs.	4,748,242 00
1901 -----	34,931,788 lbs.	5,501,782 00
1902 -----	27,860,162 lbs.	3,239,975 00
1903 -----	19,113,861 lbs.	2,520,997 00
1904 -----	29,974,154 lbs.	3,969,995 00
1905 -----	16,997,489 lbs.	2,650,605 00
1906 -----	28,726,448 lbs.	5,522,712 00
1907 -----	32,602,945 lbs.	6,341,387 00
1908 -----	40,868,772 lbs.	5,350,777 00
1909 -----	65,727,736 lbs.	8,478,142 00
1910 -----	53,721,032 lbs.	6,680,641 00
1911 -----	36,838,024 lbs.	4,604,753 00
1912 -----	34,169,997 lbs.	5,638,049 00
1913 -----	34,471,118 lbs.	5,343,023 00
Total -----	557,536,421 lbs.	\$80,129,393 00

Gold.

Reference: All State Mineralogist Reports. Bulletins 38, 57, 45.

The California State Mining Bureau has never independently collected statistics of gold, silver, and platinum production. Such figures in this Bulletin are obtained from the U. S. Geological Survey.

The gold output of the State for 1913 amounted to \$20,406,958, an increase of 3.52 per cent over the 1912 production, valued at \$19,713,478. Not only is the 1913 figure an increase over the previous year, but it is the largest total since 1883.

Of the above amount \$11,570,781 was derived from deep mines and \$8,836,177 from the placers of the State—dredging operations, of course, being classed with placer mining.

The following table shows gold production by county in California for the year 1913:

County	Value	County	Value
Alpine -----	\$537 00	Monterey -----	\$6,491 00
Amador -----	2,901,898 00	Nevada -----	2,918,733 00
Butte -----	2,269,849 00	Placer -----	220,785 00
Calaveras -----	1,175,208 00	Plumas -----	138,368 00
Del Norte -----	2,498 00	Riverside -----	12,501 00
El Dorado -----	62,688 00	Sacramento -----	2,503,633 00
Fresno -----	2,846 00	San Bernardino -----	356,524 00
Humboldt -----	25,611 00	San Luis Obispo -----	124 00
Imperial -----	31,700 00	Shasta -----	1,208,870 00
Inyo -----	237,310 00	Sierra -----	1,006,573 00
Kern -----	649,712 00	Siskiyou ² -----	180,125 00
Los Angeles -----	2,322 00	Stanislaus ² -----	253,166 00
Madera -----	14,489 00	Trinity -----	431,862 00
Mariposa -----	171,034 00	Tuolumne -----	974,409 00
Merced ³ -----	2,255 00	Yuba -----	2,491,505 00
Modoc -----	6,061 00		
Mono -----	147,271 00	Total -----	\$20,406,958 00

¹Including dredge production of Merced and Siskiyou counties.

²Dredge production included in Stanislaus total.

³Dredge production included in Stanislaus total.

Total Gold Production of California.

The following table was compiled by Chas. G. Yale, of the Division of Mineral Resources, U. S. Geological Survey, but for a number of years Statistician of the California State Mining Bureau and the U. S. Mint at San Francisco. The authorities chosen for certain periods were: J. D. Whitney, State Geologist of California; John Arthur Phillips, author of "Mining and Metallurgy of Gold and Silver" (1867); U. S. Mining Commissioner R. W. Raymond; U. S. Mining Commissioner J. Ross Browne; Wm. P. Blake, Commissioner from California to the Paris Exposition, where he made a report on "Precious Metals" (1867); John J. Valentine, author for many years of the annual report on precious metals published by Wells Fargo & Company's Express; and Louis A. Garnett, in the early days manager of the San Francisco refinery where records of gold receipts and shipments were kept. Mr. Yale obtained other data from the reports of the director of the U. S. Mint and the director of the U. S. Geological Survey. The authorities referred to, who were alive at the time of the original compilation of this table in 1894, were all consulted in person or by letter by Mr. Yale with reference to the correctness of their published data, and the final table quoted was then made up.

The figures of the last eight years are those prepared by the U. S. Geological Survey:

Year	Value	Year	Value
1848 -----	\$245,301 00	1882 -----	\$17,146,416 00
1849 -----	10,151,360 00	1883 -----	24,316,873 00
1850 -----	41,273,106 00	1884 -----	13,600,000 00
1851 -----	75,938,232 00	1885 -----	12,661,044 00
1852 -----	81,294,700 00	1886 -----	14,716,506 00
1853 -----	67,613,487 00	1887 -----	13,588,614 00
1854 -----	69,433,931 00	1888 -----	12,750,000 00
1855 -----	55,485,395 00	1889 -----	11,212,913 00
1856 -----	57,509,411 00	1890 -----	12,309,793 00
1857 -----	43,628,172 00	1891 -----	12,728,869 00
1858 -----	46,591,140 00	1892 -----	12,571,900 00
1859 -----	45,846,599 00	1893 -----	12,422,811 00
1860 -----	44,095,163 00	1894 -----	13,923,281 00
1861 -----	41,884,995 00	1895 -----	15,334,317 00
1862 -----	38,854,668 00	1896 -----	17,181,562 00
1863 -----	23,501,736 00	1897 -----	15,871,401 00
1864 -----	24,071,423 00	1898 -----	15,906,478 00
1865 -----	17,930,858 00	1899 -----	15,336,031 00
1866 -----	17,123,867 00	1900 -----	15,863,355 00
1867 -----	18,265,452 00	1901 -----	16,989,044 00
1868 -----	17,555,867 00	1902 -----	16,910,320 00
1869 -----	18,229,044 00	1903 -----	16,471,264 00
1870 -----	17,458,133 00	1904 -----	19,109,600 00
1871 -----	17,477,885 00	1905 -----	19,197,043 00
1872 -----	15,482,194 00	1906 -----	18,732,452 00
1873 -----	15,019,210 00	1907 -----	16,727,928 00
1874 -----	17,264,836 00	1908 -----	18,761,559 00
1875 -----	16,876,009 00	1909 -----	20,237,870 00
1876 -----	15,610,723 00	1910 -----	19,715,440 00
1877 -----	16,501,268 00	1911 -----	19,738,908 00
1878 -----	18,839,141 00	1912 -----	19,713,478 00
1879 -----	19,626,654 00	1913 -----	20,406,958 00
1880 -----	20,030,761 00		
1881 -----	19,223,155 00	Total -----	\$1,588,087,904 00

Iron Ore.

Reference: State Mineralogist Reports II, IV, V, X, XII, XIII.
Bulletin 38.

Production of iron ore in California in 1913 amounted to 2,343 short tons, valued at a total of \$4,485, as compared to the 1912 output of 2,508 tons, worth \$2,508.

Deposits of iron ore of varying size and quality are known to exist in thirty-one of the fifty-eight counties of the State, but to date very little development has been done. The future possibilities of this branch of the mineral industry in California are almost unlimited, as far as ore resources are concerned, but the lack of available coking coal, and other economic problems, have so far acted as an effective barrier toward advancement along these lines.

Total iron ore production in the State, with annual amounts and values, is as follows:

Year	Amount	Value
1893 -----	250 tons	\$2,000 00
1894 -----	200 tons	1,500 00
1907 -----	400 tons	400 00
1909 -----	108 tons	174 00
1910 -----	579 tons	900 00
1911 -----	558 tons	558 00
1912 -----	2,508 tons	2,508 00
1913 -----	2,343 tons	4,485 00
Totals -----	6,946 tons	\$12,525 00

Lead.

Reference: State Mineralogist Reports IV, VIII, X.

Thirty-seven producers, twenty-two of whom were located in Inyo County, produced 3,640,951 pounds of lead in 1913 having a total value of \$160,202, as compared with the 1912 output of 1,370,067 pounds, worth \$61,653. This large increase was the direct result of the active operation of several lead properties in Inyo County which were idle during the previous year. The average price received for this metal during 1913 was 4.4 cents per pound, as compared with 4.5 cents, which held for 1912. Galena, the most common lead ore in the State, is widely distributed and is very commonly associated with ores of gold, silver, and copper.

Tabulated county returns for 1913, showing amount and value in each instance, are as follows:

County	Amount	Value
Calaveras -----	7,006 lbs.	\$308 00
Inyo -----	3,322,308 lbs.	146,182 00
Kern -----	1,376 lbs.	61 00
Nevada -----	2,090 lbs.	92 00
Placer -----	805 lbs.	35 00
Plumas -----	5,621 lbs.	247 00
San Bernardino -----	279,241 lbs.	12,287 00
Shasta -----	19,070 lbs.	839 00
Sierra -----	2,228 lbs.	98 00
Tuolumne -----	1,206 lbs.	53 00
Totals -----	3,640,951 lbs.	\$160,202 00

Statistics on lead production in California were first compiled by this Bureau in 1887. Amount and value of the output, annually, with total figures, to date, are given in the following table:

Year	Amount	Value
1887	580 tons	\$52,200 00
1888	450 tons	38,250 00
1889	470 tons	35,720 00
1890	400 tons	36,000 00
1891	570 tons	49,020 00
1892	680 tons	54,400 00
1893	333 tons	24,975 00
1894	475 tons	28,500 00
1895	796 tons	49,364 00
1896	646 tons	38,805 00
1897	298 tons	20,264 00
1898	328 tons	23,907 00
1899	360 tons	30,642 00
1900	520 tons	41,600 00
1901	360 tons	28,820 00
1902	175 tons	12,230 00
1903	55 tons	3,960 00
1904	62 tons	5,270 00
1905	266 tons	25,083 00
1906	169 tons	19,307 00
1907	164 tons	16,690 00
1908	562 tons	46,663 00
1909	1,343 tons	144,897 00
1910	1,508 tons	134,082 00
1911	701 tons	63,173 00
1912	685 tons	61,653 00
1913	1,820 tons	160,202 00
Totals	14,776 tons	\$1,245,677 00

Molybdenum.

Reference: Bulletin 67, "Molybdenite."

Molybdenum is used to a limited extent in the steel industry, and experiments have been carried on with a view toward using this metal in the manufacture of filaments for electric bulbs. Deposits of molybdenum ores have been observed in several localities in California, but no commercial production has been attempted to date.

The above reference gives detailed data on occurrence, characteristics, etc., of this material.

Platinum.

Reference: State Mineralogist Reports XII, XIII. Bulletin 38.

The platinum annually produced in California comes almost entirely as an incidental discovery in dredging and other gold placer operations. According to the U. S. Geological Survey the actual platinum output for the State during the calendar year 1913 was 368 ounces, valued at \$17,738, as compared with the 1912 production of 603 ounces, worth \$19,731.

Total amount and value of platinum production in California, by years, is shown in the following tabulation:

Year	Amount	Value
1887	100 ozs.	\$400 00
1888	500 ozs.	2,600 00
1889	500 ozs.	2,000 00
1890	600 ozs.	2,500 00
1891	100 ozs.	500 00
1892	80 ozs.	440 00
1893	75 ozs.	517 00
1894	100 ozs.	600 00
1895	150 ozs.	900 00
1896	162 ozs.	944 00
1897	150 ozs.	900 00
1898	300 ozs.	1,800 00
1899	300 ozs.	1,800 00
1901	250 ozs.	3,200 00
1902	39 ozs.	468 00
1903		1,052 00
1904		1,849 00
1905	200 ozs.	3,320 00
1906	91 ozs.	1,647 00
1907	300 ozs.	6,255 00
1908	706 ozs.	13,414 00
1909	416 ozs.	10,400 00
1910	337 ozs.	8,386 00
1911	511 ozs.	14,873 00
1912	603 ozs.	19,731 00
1913	268 ozs.	17,728 00
Totals	6,938 ozs.	\$117,634 00

Quicksilver.

Reference: State Mineralogist Reports IV, X, XII, XIII. Bulletin 27.

Reports were received from sixty-one quicksilver mines, only 16 of which were operative during the year 1913. The active mines were distributed through eight counties and the production amounted to 15,661 flasks of 75 pounds, valued at \$630,042, or an average of \$40.23 per flask, as compared with the 1912 output of 20,600 flasks, worth \$866,024, or an average of \$42.04 per flask.

This is a decrease in amount of 4,939 flasks, and in value of \$235,982 and a decrease in the average price per flask of \$1.81. Three hundred and thirty-seven men were employed in the quicksilver mines and reduction plants during the year.

Fresno, Lake, and San Luis Obispo counties reported an increase in production for 1913 over the previous year; San Benito, Santa Clara, Sonoma, and Trinity counties fell off to a considerable extent; and the Napa County output was indential with that of 1912. Some develop-

ment work was carried on in the non-producing mines, but on the whole 1913 was the quietest year ever experienced by the industry since records have been kept by the Mining Bureau.

The following table shows distribution by counties in 1913, with increase or decrease in amount in each instance, as compared with 1912:

County	Amount	Value	Increase	Decrease
Fresno -----	375 flasks	\$15,086 00	39 flasks	-----
Lake -----	395 flasks	15,891 00	186 flasks	-----
Napa -----	287 flasks	11,546 00	-----	-----
San Benito -----	9,719 flasks	390,995 00	-----	24 flasks
San Luis Obispo -----	1,160 flasks	46,667 00	494 flasks	-----
Santa Clara -----	3,709 flasks	149,213 00	-----	4,986 flasks
Sonoma -----	12 flasks	483 00	-----	634 flasks
Trinity -----	4 flasks	161 00	-----	14 flasks
Totals -----	15,661 flasks	\$630,042 00	-----	4,939 flasks

The total amount and value of the quicksilver production of California since records were first compiled by the State Mining Bureau are given in the following tabulation:

Year	Amount	Value
1887 -----	33,760 flasks	\$1,425,000 00
1888 -----	33,250 flasks	1,413,125 00
1889 -----	26,464 flasks	1,190,500 00
1890 -----	22,926 flasks	1,203,615 00
1891 -----	22,904 flasks	1,036,386 00
1892 -----	27,933 flasks	1,139,600 00
1893 -----	30,164 flasks	1,108,527 00
1894 -----	30,416 flasks	934,000 00
1895 -----	36,104 flasks	1,337,131 00
1896 -----	30,765 flasks	1,075,449 00
1897 -----	26,648 flasks	993,445 00
1898 -----	31,092 flasks	1,188,626 00
1899 -----	29,454 flasks	1,405,045 00
1900 -----	26,317 flasks	1,182,786 00
1901 -----	26,720 flasks	1,285,014 00
1902 -----	29,552 flasks	1,276,524 00
1903 -----	32,094 flasks	1,335,954 00
1904 -----	28,876 flasks	1,086,323 00
1905 -----	24,655 flasks	886,081 00
1906 -----	19,516 flasks	712,334 00
1907 -----	17,379 flasks	663,178 00
1908 -----	18,039 flasks	763,520 00
1909 -----	16,217 flasks	773,788 00
1910 -----	17,665 flasks	799,002 00
1911 -----	19,109 flasks	879,205 00
1912 -----	20,600 flasks	866,024 00
1913 -----	15,661 flasks	630,042 00
Totals -----	694,280 flasks	\$28,590,224 00

Silver.

Reference: State Mineralogist Reports IV, VIII, XII.

Silver production in California during the year 1913 amounted to \$832,553, as compared with the 1912 output of \$799,584, according to the records of the United States Geological Survey, from which source these figures, along with gold and platinum, are derived. The average price for the year was 60.4 cents per ounce, a decrease from the average price of 61.5 cents which was paid for silver during 1912.

Tabulated county production returns are as follows:

Alpine -----	\$4 00	Monterey -----	\$27 00
Amador -----	18,097 00	Nevada -----	26,542 00
Butte -----	5,163 00	Placer -----	2,972 00
Calaveras -----	61,076 00	Plumas -----	705 00
Del Norte -----	16 00	Riverside -----	104 00
El Dorado -----	250 00	Sacramento -----	3,406 00
Fresno -----	15 00	San Bernardino -----	44,413 00
Humboldt -----	132 00	San Luis Obispo -----	1 00
Imperial -----	94 00	Shasta -----	448,031 00
Inyo -----	136,854 00	Sierra -----	4,305 00
Kern -----	11,851 00	Siskiyou ² -----	1,228 00
Lassen -----	2 00	Stanislaus ¹ -----	671 00
Los Angeles -----	27 00	Trinity -----	2,119 00
Madera -----	1,617 00	Tuolumne -----	24,381 00
Mariposa -----	7,430 00	Yuba -----	7,571 00
Merced ³ -----	92 00		
Modoc -----	94 00		
Mono -----	23,263 00	Total -----	\$832,553 00

¹Including dredge production of Merced and Siskiyou.

²Dredge production included in Stanislaus total.

³Dredge production included in Stanislaus total.

Annual value of the silver production in California, 1887-1913 inclusive, is shown in the following table:

Year	Value	Year	Value
1887 -----	\$1,632,003 00	1902 -----	\$616,412 00
1888 -----	1,700,000 00	1903 -----	517,444 00
1889 -----	754,793 00	1904 -----	873,525 00
1890 -----	1,060,613 00	1905 -----	678,494 00
1891 -----	953,157 00	1906 -----	817,830 00
1892 -----	463,602 00	1907 -----	751,646 00
1893 -----	537,157 00	1908 -----	873,057 00
1894 -----	297,332 00	1909 -----	1,091,092 00
1895 -----	599,789 00	1910 -----	993,646 00
1896 -----	422,463 00	1911 -----	673,336 00
1897 -----	452,789 00	1912 -----	799,584 00
1898 -----	414,055 00	1913 -----	832,553 00
1899 -----	504,012 00		
1900 -----	1,510,344 00		
1901 -----	1,229,356 00	Total -----	\$22,050,084 00

Tungsten.

Reference: Bulletin 38.

Tungsten was first commercially produced in California in 1905. This metal is used in the steel industry and as a filament in electric light bulbs. The value of the ore is based upon the content of tungstic trioxide (WO_3), and quotations are commonly made per unit of WO_3 present.

During the year 1913 the tungsten ore produced in the State amounted to 7,592 tons, valued at \$234,673, as compared with the 1912 output of 8,042 tons, worth \$206,000.

The annual value of tungsten produced in California since the inception of the industry is given herewith:

Year	Value	Year	Value
1905 -----	\$18,800 00	1911 -----	\$127,706 00
1906 -----	189,100 00	1912 -----	206,000 00
1907 -----	120,587 00	1913 -----	234,673 00
1908 -----	37,750 00		
1909 -----	190,500 00		
1910 -----	208,245 00	Total -----	\$1,333,361 00

Tin.

Reference: Bulletin 67, "Cassiterite."

A small deposit of tin ore, cassiterite, located near Corona, in Riverside County, was operated during the years 1891-92. Amount and value of the output during that time is tabulated below. No other commercial production of tin has ever been made in California, and no deposits of any size are known. Small quantities of stream tin have been found in some of the placer workings in northern California, but never in paying amounts.

Total output of tin in California:

Year	Amount	Value
1891 -----	125,289 lbs.	\$27,564 00
1892 -----	126,000 lbs.	32,400 00
Totals -----	251,289 lbs.	\$59,964 00

Vanadium.

No commercial production of vanadium has ever been made in California. Traces of this metal have been found in the southeastern portion of the State and two companies have done considerable development work recently in the endeavor to open up paying quantities of vanadium ore. There is a growing demand for vanadium, for use in the steel industry.

Zinc.

Reference: Bulletin 38.

Although zinc has long been known as an ingredient in many of the copper and other ores of the State, the first commercial production occurred in 1906. During 1913, 1,157,947 pounds of zinc were marketed having a total value of \$64,845, as compared with the 1912 output of 4,331,391 pounds, worth \$298,866. The average price per pound for 1913 was 5.6 cents, as compared with 6.9 cents for the previous year. The principal sources of zinc ores are Inyo, San Bernardino, and Shasta counties.

Total production figures for zinc output of the State are as follows:

Year	Amount	Value
1906		\$12,566 00
1907		10,598 00
1908		3,544 00
1911	2,679,842 lbs.	152,751 00
1912	4,331,391 lbs.	298,866 00
1913	1,157,947 lbs.	64,845 00
Total		\$543,170 00

CHAPTER FOUR.

STRUCTURAL MATERIALS.

As indicated by this chapter heading, the mineral substances herein considered are those more or less directly used in building and structural work. This branch of the mineral industry for 1913 was valued at \$17,664,328. Only a few years ago its value was of no significance in considering the total mineral production of the State. With the growth, in population and otherwise, of California, this subdivision of the mineral industry in the State will increase indefinitely. Deposits of granite, marble and other building stones are distributed widely throughout the State, and slowly but surely transportation and other facilities are being extended so that the growing demand may be met. The largest single item, cement, has an unparalleled record of growth since the inception of the industry in California twenty-three years ago. Not until 1904 did the annual value of cement produced reach the million dollar mark. It has increased 500 per cent in nine years. Crushed rock production is yearly becoming more worthy of consideration, due to the wonderful strides recently taken in concrete building, as well as to activity in the building of good roads. Brick, with an annual output worth nearly \$3,000,000, is slowly decreasing, due to the popularity of cement and concrete, but nevertheless this item will be an important one for many years to come, and, of course, a market for fire and fancy brick of all kinds will never be lacking.

The following table gives the comparative figures for the value of structural materials produced in California during the years 1912 and 1913. Thirty-nine counties contributed to this total, and there is not a county in the State which is not capable of a considerable output of at least one of the following classes of material.

Structural materials, by value, 1912-1913, showing increase or decrease in each instance:

Substance	Value, 1913	Value, 1912	Increase value	Decrease value
Bituminous rock ----	\$78,479 00	\$87,467 00	-----	\$8,988 00
Brick -----	2,915,350 00	2,940,290 00	-----	24,940 00
Cement -----	7,743,024 00	6,074,661 00	\$1,668,363 00	-----
Chrome -----	12,700 00	11,260 00	1,440 00	-----
Lime -----	528,547 00	464,440 00	64,107 00	-----
Magnesite -----	77,056 00	105,120 00	-----	28,064 00
Marble -----	113,282 00	74,120 00	39,162 00	-----
Sandstone -----	27,870 00	22,574 00	5,296 00	-----
Stone industry -----	6,168,020 00	5,473,928 00	694,092 00	-----
Totals -----	\$17,664,328 00	\$15,253,860 00		
Total increase -----			\$2,410,468 00	

Asphalt.

Reference: State Mineralogist Reports VII, X, XII, XIII. Bulletins 16 and 32.

Deposits of natural asphalt exist in nearly all the coast counties of California between San Francisco and Los Angeles. At various times in the past small amounts of this natural substance have been used, but on account of the large quantity of crude oil of asphalt base which is annually refined here it has been found that a better grade of asphalt can be produced for less money than the natural deposits afford. Consequently, no asphalt is mined or quarried in the natural state.

During the calendar year 1913, 344,000 tons of the refined product, valued at \$2,752,000, or \$8 per ton, were sold, as compared with the 1912 output of 250,000 tons, valued at \$2,500,000. These figures are only presumed to be approximate and are not added to the total of the State's mineral output because the value of the crude petroleum from which it was manufactured has been included and the addition of the value of this by-product would give a false result, too high by the above amount. The great bulk of the asphalt produced is used in street paving, although it has various other growing uses, such as for roofing, insulating, as a preservative for piling, etc.

Forty-eight companies own refineries in the State, either operating or capable of being operated. Several companies own more than one plant. These refineries are located either adjacent to the oil fields in Fresno, Kern, Los Angeles, Orange, and Santa Barbara counties, or at tide water in the neighborhood of San Francisco, San Diego, and Ventura.

Bituminous Rock.

Reference: State Mineralogist Reports XII, XIII.

Reports were received by the State Mining Bureau from nine companies owning bituminous rock quarries. But three were active during 1913. The total output for the year amounted to 37,541 tons, valued at \$78,479, an average of \$2.09 per ton, as compared with the 1912 production of 44,073 tons, worth \$87,467. This material is in reality only a poor grade of natural asphalt and production is annually declining because of the fact that asphalt from the various oil refineries is continually becoming cheaper and more available for use in all parts of the State.

Distribution by county for 1913 is as follows:

County	Amount	Value
San Luis Obispo.....	609 tons	\$1,149 00
Santa Barbara	10,000 tons	10,000 00
Santa Cruz	26,932 tons	67,330 00
Totals	37,541 tons	\$78,479 00

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California since the first records were compiled by the State Mining Bureau, annually, since 1887:

Bituminous Rock.

Year	Amount	Value	Year	Amount	Value
1887 -----	36,000 tons	\$160,000 00	1902 -----	33,490 tons	\$43,411 00
1888 -----	50,000 tons	257,000 00	1903 -----	21,944 tons	53,106 00
1889 -----	40,000 tons	170,000 00	1904 -----	45,280 tons	175,680 00
1890 -----	40,000 tons	170,000 00	1905 -----	24,753 tons	60,436 00
1891 -----	39,962 tons	154,164 00	1906 -----	16,077 tons	45,204 00
1892 -----	24,000 tons	72,000 00	1907 -----	24,122 tons	72,835 00
1893 -----	32,000 tons	192,036 00	1908 -----	30,718 tons	109,818 00
1894 -----	31,214 tons	115,193 00	1909 -----	34,123 tons	116,436 00
1895 -----	38,921 tons	121,586 00	1910 -----	87,547 tons	165,711 00
1896 -----	49,456 tons	122,500 00	1911 -----	75,125 tons	117,279 00
1897 -----	45,470 tons	128,173 00	1912 -----	44,073 tons	87,467 00
1898 -----	46,836 tons	137,575 00	1913 -----	37,541 tons	78,479 00
1899 -----	40,321 tons	116,097 00			
1900 -----	25,306 tons	71,495 00			
1901 -----	24,052 tons	66,354 00			
			Totals --	1,038,331 tons	\$3,180,035 00

Brick.

Reference: Bulletin 38.

Sixty-two brick yards distributed through twenty-six counties produced 358,754 thousand brick of all kinds during 1913, having a total value of \$2,915,350, or a general average value of \$7.87 per thousand. As compared to the previous year these figures show an increase in amount, but a decrease in value, as the 1912 output amounted to 337,233, worth \$2,940,290, with a general average value of \$8.71 per thousand. A great variety of brick is annually produced in the State, including common, fire, pressed, glazed, sand lime, and others. As far as possible the different kinds have been segregated in the following tabulation, but in many cases operators report their total without any classification and such figures are of necessity listed as miscellaneous. It will therefore be understood that in no case does the total of a subdivision represent the true amount if figures are also given in the miscellaneous column.

According to Bulletin No. 38, issued by the California State Mining Bureau, the following analyses show the average and the maximum and minimum of the ingredients commonly occurring in brick clays. A clay in which the percentage of any one or more of the ingredients mentioned is much above the maximum given or below the minimum will prove an inferior, if not worthless, clay for even common brick.

Chemical Analyses of Common-brick Clays.

	Average	Minimum	Maximum
Silica (SiO_2), combined-----	15.0%	12.0%	30.0%
Silica sand -----	55.0%	20.0%	60.0%
Alumina (Al_2O_3) -----	14.0%	11.0%	25.0%
Water (H_2O), combined-----	4.0%	3.0%	9.0%
Water moisture -----	2.0%	0.0%	6.0%
Iron oxide (Fe_2O_3)-----	4.0%	2.5%	8.0%
Lime (CaO) -----	1.5%	0.5%	7.0%
Magnesia (MgO) -----	1.5%	0.3%	7.0%
Alkalies (K_2O , Na_2O)-----	3.5%	2.0%	7.0%

The detailed figures of brick production for 1913, by counties, are as follows:

Brick production for 1913, by Counties.

County	Common		Pressed, fire, glazed		Sand, lime		Miscellaneous		Total	
	Amount, thousands	Value	Amount, thousands	Value	Amount, thousands	Value	Amount, thousands	Value	Amount, thousands	Value
Alameda	11,393	\$52,250 00	2,584	\$70,687 00					13,977	\$122,937 00
Amador			2,000	30,000 00					2,000	30,000 00
Contra Costa	24,174	120,872 00					6,237	\$92,081 00	30,411	212,953 00
Fresno	5,500	44,000 00							5,500	44,000 00
Humboldt	500	4,150 00							500	4,150 00
Imperial	5,500	44,000 00							5,500	44,000 00
Kern	1,625	22,000 00							1,625	22,000 00
Los Angeles	153,529	779,121 00	3,000	95,000 00	1,200	\$7,200 00	47,183	870,785 00	204,912	1,752,106 00
Madera	315	1,650 00							315	1,650 00
Marin	16,000	70,500 00							16,000	70,500 00
Orange									2,100	14,000 00
Placer			1,900	40,000 00					1,900	40,000 00
Riverside	1,500	10,000 00	2,030	20,300 00					3,530	30,300 00
Sacramento	21,662	126,023 00					873	18,168 00	22,535	144,191 00
San Bernardino	350	2,100 00							350	2,100 00
San Diego	5,811	39,800 00					3,573	28,600 00	9,384	68,400 00
San Joaquin							6,314	73,768 00	6,314	73,768 00
San Luis Obispo	1,500	15,000 00					1,418	44,680 00	1,500	15,000 00
San Mateo									1,418	44,680 00
Santa Barbara	3,000	24,000 00							3,000	24,000 00
Santa Clara	18,000	95,000 00							18,000	95,000 00
Shasta							360	4,330 00	360	4,330 00
Stanislaus	300	2,400 00							300	2,400 00
Tehama	300	1,800 00							300	1,800 00
Tulare	6,000	45,000 00							6,000	45,000 00
Ventura	1,023	6,085 00							1,023	6,085 00
Totals	277,982	\$1,505,751 00	11,514	\$255,987 00	1,200	\$7,200 00	68,058	\$1,146,412 00	358,754	\$2,915,350 00

Record of brick production in the State has been kept since 1893 by this Bureau. The annual and total figures since that date, for amount and value, are given in the following table:

Year	Amount, thousands	Value
1893	103,900 M	\$801,750 00
1894	81,675 M	457,125 00
1895	131,772 M	672,360 00
1896	24,000 M	524,740 00
1897	97,468 M	563,240 00
1898	100,102 M	571,362 00
1899	125,950 M	754,730 00
1900	137,191 M	905,210 00
1901	130,766 M	860,488 00
1902	169,851 M	1,306,215 00
1903	214,403 M	1,999,546 00
1904	281,750 M	1,994,740 00
1905	286,618 M	2,273,786 00
1906	277,762 M	2,538,848 00
1907	362,167 M	3,438,951 00
1908	332,872 M	2,506,495 00
1909	333,846 M	3,059,929 00
1910	340,883 M	2,934,731 00
1911	327,474 M	2,638,121 00
1912	337,233 M	2,940,290 00
1913	358,754 M	2,915,350 00
Totals	4,556,440 M	\$36,658,007 00

Cement.

Reference: State Mineralogist Reports VIII, IX, XII. Bulletin 38.

Cement production in California during the calendar year 1913 amounted to 6,167,806 barrels, valued at \$7,743,024, as compared with 6,198,634 barrels, worth \$6,074,661, produced in 1912, or a decrease of 30,828 barrels in amount, and an increase of \$1,668,363 in value. Seven plants, employing 3,256 men, were operative during the year.

The cement industry is so centralized that it is impossible to apportion the production to the counties in which plants are located without making private business public.

Cement was first commercially produced in the State in 1891. While the total figures are not of the same magnitude as those for gold and petroleum, the growth of the industry has been more than rapid, and a comparison of the annual figures representing the output since the inception of the industry is of interest.

Annual production of cement in California is as follows:

Year	Amount	Value
1891 -----	5,000 bbls.	\$15,000 00
1892 -----	5,000 bbls.	15,000 00
1893 -----		
1894 -----	8,000 bbls.	21,600 00
1895 -----	16,383 bbls.	32,556 00
1896 -----	9,500 bbls.	28,250 00
1897 -----	18,000 bbls.	66,000 00
1898 -----	50,000 bbls.	150,000 00
1899 -----	60,000 bbls.	180,000 00
1900 -----	52,000 bbls.	121,000 00
1901 -----	71,800 bbls.	159,842 00
1902 -----	171,000 bbls.	423,600 00
1903 -----	640,868 bbls.	968,727 00
1904 -----	969,538 bbls.	1,539,807 00
1905 -----	1,265,553 bbls.	1,791,916 00
1906 -----	1,286,000 bbls.	1,941,250 00
1907 -----	1,613,563 bbls.	2,585,577 00
1908 -----	1,629,615 bbls.	2,359,692 00
1909 -----	3,779,205 bbls.	4,969,437 00
1910 -----	5,453,193 bbls.	7,485,715 00
1911 -----	6,371,369 bbls.	9,085,625 00
1912 -----	6,198,634 bbls.	6,074,661 00
1913 -----	6,167,806 bbls.	7,743,024 00
Totals -----	35,842,027 bbls.	\$47,758,279 00

Chrome.

Reference: State Mineralogist Reports IV, XII. Bulletin 38.

The total output of chromic iron ore in California for 1913 was almost the same as for the previous year, although the sources from which it was derived were different to some extent.

This material is found widely distributed throughout the State, but owing to the fact that freight rates to the principal markets in the East are so high, local producers have to depend on a very limited and fluctuating demand on the Pacific coast. Furthermore, the supply required at any particular time is usually procured from the nearest deposit, and the result is aptly illustrated by the county returns of the past two years, as follows:

County	1912		1913	
	Amount	Value	Amount	Value
Calaveras -----			900 tons	\$9,900 00
Fresno -----	50 tons	\$950 00		
Shasta -----	1,000 tons	8,000 00	280 tons	2,800 00
Siskiyou -----	220 tons	2,310 00		
Totals -----	1,270 tons	\$11,260 00	1,180 tons	\$12,700 00

This branch of the mineral industry is capable of great expansion, were a permanent market assured. Owners of properties almost unanimously report large deposits of good grade material, but no demand.

The two active properties last year employed ten men in their operation. Open cut method of mining was used and in one case haulage was by aerial tram and wagon before reaching the railroad.

Chromite has been produced to some extent in California since 1887, when the first accurate mineral production records were compiled by the State Mining Bureau.

The annual output of chromite since 1887 is as follows:

Year	Amount	Value
1887	3,000 tons	\$10,000 00
1888	1,500 tons	20,000 00
1889	2,000 tons	30,000 00
1890	3,599 tons	53,985 00
1891	1,372 tons	20,580 00
1892	1,500 tons	22,500 00
1893	3,319 tons	49,785 00
1894	3,680 tons	39,980 00
1895	1,740 tons	16,795 00
1896	786 tons	7,775 00
1897		
1898		
1899		
1900	140 tons	1,400 00
1901	130 tons	1,950 00
1902	315 tons	4,725 00
1903	150 tons	2,250 00
1904	123 tons	1,845 00
1905	40 tons	600 00
1906	317 tons	2,859 00
1907	302 tons	6,040 00
1908	350 tons	6,195 00
1909	436 tons	5,300 00
1910	749 tons	9,707 00
1911	935 tons	14,197 00
1912	1,270 tons	11,260 00
1913	1,180 tons	12,700 00
Totals	28,933 tons	\$382,437 00

Lime.

Reference: Bulletin 38.

Eleven counties reported a production of 613,444 barrels of lime during 1913 having a total value of \$528,547, or an average of 86 cents per barrel, spot value. As compared with the output of 1912, consisting of 522,118 barrels, worth \$464,440, this is an increase of 91,326 barrels, in amount, and \$64,107 in value, but a decrease of 3 cents in the average price per barrel.

Distribution by counties is shown in the following table:

County	Amount	Value
Alameda -----	5,000 bbls.	\$5,000 00
Amador -----	1,000 bbls.	1,200 00
Contra Costa -----	150,551 bbls.	127,968 00
Kern -----	135,000 bbls.	91,200 00
Mono -----	2,135 bbls.	1,600 00
San Bernardino -----	121,544 bbls.	113,856 00
Santa Barbara -----	26,512 bbls.	25,910 00
Santa Clara -----	13,107 bbls.	9,783 00
Santa Cruz -----	75,000 bbls.	60,000 00
Shasta -----	8,595 bbls.	7,030 00
Tuolumne -----	75,000 bbls.	85,000 00
Totals -----	613,444 bbls.	\$528,547 00

Magnesite.

Reference: State Mineralogist Reports XII, XIII. Bulletin 38.

Reports from owners of twenty-four magnesite properties located in nine counties of the State were received by the Mining Bureau for the calendar year 1913. Actual production was comparatively small, only 9,632 tons having been produced, having an arbitrary value of \$77,056. In considering mineral production the value of the crude material is invariably used. Magnesite presents a peculiar example of a material which is not handled on the market in the crude state. It is all calcined and ground before being considered marketable. The value of the calcined magnesite varies, but rarely if ever falls below \$20 per ton. Roughly, two and a half tons of the crude material make one ton of the calcined. Hence the derivation of the foregoing stated total value of the crude production, figured on a basis of \$8.00 per ton.

Magnesite products have been found to be highly satisfactory and are growing in popularity, and the future for this industry appears to be bright. A vast supply is already known to exist in California and only a sufficient demand is lacking to make this an item of consequence in the mineral total of the State.

Actual production for 1913, by county, is given in the following table, with total crude value, figured according to the foregoing assumption:

County	Amount	Value
Fresno -----	1,135 tons	\$9,080 00
Riverside -----	569 tons	4,552 00
Santa Clara -----	70 tons	560 00
Tulare -----	7,858 tons	62,864 00
Totals -----	9,632 tons at \$8	\$77,056 00

Annual production for California, amount and value, since 1887, is shown in the following tabulation:

Year	Amount	Value
1887 -----	600 tons	\$9,000 00
1888 -----	600 tons	9,000 00
1889 -----	600 tons	9,000 00
1890 -----	600 tons	9,000 00
1891 -----	1,500 tons	15,000 00
1892 -----	1,500 tons	15,000 00
1893 -----	1,093 tons	10,930 00
1894 -----	1,440 tons	10,240 00
1895 -----	2,200 tons	17,000 00
1896 -----	1,500 tons	11,000 00
1897 -----	1,143 tons	13,671 00
1898 -----	1,263 tons	19,075 00
1899 -----	1,280 tons	18,480 00
1900 -----	2,252 tons	19,333 00
1901 -----	4,726 tons	43,057 00
1902 -----	2,830 tons	20,655 00
1903 -----	1,361 tons	20,515 00
1904 -----	2,850 tons	9,298 00
1905 -----	3,933 tons	16,221 00
1906 -----	4,032 tons	40,320 00
1907 -----	6,405 tons	57,720 00
1908 -----	10,582 tons	80,822 00
1909 -----	7,942 tons	62,588 00
1910 -----	16,570 tons	113,887 00
1911 -----	8,858 tons	67,430 00
1912 -----	10,512 tons	105,120 00
1913 -----	9,632 tons	77,056 00
Totals -----	107,804 tons	\$900,418 00

Marble.

Reference: State Mineralogist Report XII. Bulletin 38.

Production of marble is steadily on the increase in California. During 1913, 41,654 cubic feet were sold having a spot value of \$113,282, as compared with the 1912 production of 27,820 cubic feet, worth \$74,120, an increase of 13,834 cubic feet, in amount, and \$39,162 in value. Thirty operators filed reports with this Bureau, owning marble deposits distributed among the following counties:

Amador, Calaveras, Imperial, Inyo, Los Angeles, Mariposa, Mono, Riverside, San Bernardino, San Luis Obispo, Shasta, Siskiyou, Sonoma, Tuolumne, and Tulare.

The actual output for the year was from four counties, as here indicated:

County	Amount	Value
Imperial -----	750 cu. ft.	\$7,260 00
Inyo -----	3,200 cu. ft.	11,500 00
Tulare -----	392 cu. ft.	796 00
Tuolumne -----	37,312 cu. ft.	93,726 00
Totals -----	41,654 cu. ft.	\$113,282 00

Data on annual production since 1887, as compiled by the State Mining Bureau, follows. Previous to 1894 no records of amount were preserved:

Year	Amount	Value
1887 -----		\$5,000 00
1888 -----		5,000 00
1889 -----		87,030 00
1890 -----		80,000 00
1891 -----		100,000 00
1892 -----		115,000 00
1893 -----		40,000 00
1894 -----	38,441	98,326 00
1895 -----	14,864	56,566 00
1896 -----	7,889	32,415 00
1897 -----	4,102	7,280 00
1898 -----	8,050	23,594 00
1899 -----	9,682	10,550 00
1900 -----	4,103	5,891 00
1901 -----	2,945	4,630 00
1902 -----	19,305	37,616 00
1903 -----	84,624	97,354 00
1904 -----	55,401	94,208 00
1905 -----	73,303	129,450 00
1906 -----	31,400	75,800 00
1907 -----	37,512	118,066 00
1908 -----	18,653	47,665 00
1909 -----	79,600	238,400 00
1910 -----	18,960	50,200 00
1911 -----	20,201	54,103 00
1912 -----	27,820	74,120 00
1913 -----	41,654	113,282 00
Totals -----	598,509	\$1,801,546 00

Onyx and Travertine.

Reference: State Mineralogist Report XII. Bulletin 38.

Onyx and travertine marble were produced in California to the total value of \$91,400 between the years of 1887 and 1896, as shown below.

Since the latter date there has been no commercial production of this class of building stone in the State, although many counties contain deposits which have not been exhausted by any means.

Year	Value
1887 -----	\$900 00
1888 -----	900 00
1889 -----	900 00
1890 -----	1,500 00
1891 -----	2,400 00
1892 -----	1,800 00
1893 -----	27,000 00
1894 -----	20,000 00
1895 -----	12,000 00
1896 -----	24,000 00
Total -----	\$91,400 00

Sandstone.

Reference: State Mineralogist Report XII. Bulletin 38.

A decrease in amount and a small increase in value is shown in the sandstone production in California for 1913 as compared with 1912. During 1913, 62,227 cubic feet were sold having a total spot value of \$27,870, while the previous year showed an output of 66,487 cubic feet, worth \$22,574.

The 1913 production came from six quarries located in five counties. Reports were received from nineteen additional quarries scattered through eight counties besides those shown below, all of which were idle during the year.

An unlimited amount of high grade sandstone is available in California, but the wide use of concrete in buildings of every character, as well as the popularity of a lighter colored building stone, has retarded this branch of the mineral industry very seriously during recent years.

Distribution of 1913 output, by counties, follows:

County	Amount	Value
Amador -----	2,500 cu. ft.	\$2,500 00
Colusa -----	34,927 cu. ft.	15,550 00
Napa -----	20,000 cu. ft.	8,000 00
Santa Barbara -----	4,500 cu. ft.	1,670 00
Ventura -----	300 cu. ft.	150 00
Totals -----	62,227 cu. ft.	\$27,870 00

Amount and value, as far as contained in the records of this Bureau, are presented herewith, with total value from 1887 to date:

Year	Amount	Value
1887		\$175,000 00
1888		150,000 00
1889		175,598 00
1890		100,000 00
1891		100,000 00
1892		50,000 00
1893		26,314 00
1894		113,592 00
1895		35,373 00
1896		28,379 00
1897		24,086 00
1898		46,384 00
1899	56,264 cu. ft.	103,384 00
1900	378,468 cu. ft.	254,140 00
1901	266,741 cu. ft.	192,132 00
1902	212,123 cu. ft.	142,506 00
1903	353,002 cu. ft.	585,309 00
1904	363,487 cu. ft.	567,181 00
1905	302,813 cu. ft.	483,268 00
1906	182,076 cu. ft.	164,068 00
1907	159,573 cu. ft.	148,148 00
1908	93,301 cu. ft.	55,151 00
1909	79,240 cu. ft.	37,032 00
1910	165,971 cu. ft.	80,443 00
1911	255,313 cu. ft.	127,314 00
1912	66,487 cu. ft.	22,574 00
1913	62,227 cu. ft.	27,870 00
Total value		\$4,015,246 00

Serpentine.

Reference: Bulletin 38.

Total amount and value of the serpentine production in California is given in the tabulation below. No production has been reported since 1907. This class of building stone exists in various sections of the State, but a really high grade material was never obtained. Both in attractive appearance and in actual quality it has been found lacking to date.

The following table shows the amount and value of serpentine since 1895 as recorded by this Bureau:

Year	Amount	Value
1895 -----	4,000 cu. ft.	\$1,000 00
1896 -----	1,500 cu. ft.	6,000 00
1897 -----	2,500 cu. ft.	2,500 00
1898 -----	750 cu. ft.	3,000 00
1899 -----	500 cu. ft.	2,000 00
1900 -----	350 cu. ft.	2,000 00
1901 -----	89 cu. ft.	890 00
1902 -----	512 cu. ft.	5,065 00
1903 -----	99 cu. ft.	800 00
1904 -----	200 cu. ft.	2,310 00
1906 -----	847 cu. ft.	1,694 00
1907 -----	1,000 cu. ft.	3,000 00
Totals -----	12,347 cu. ft.	\$33,259 00

Slate.

Reference: Bulletin 38.

Slate was first produced in California in 1889. Up to and including 1910 such production was continuous. Many large deposits are known in the State, especially in El Dorado and Mariposa counties, but the demand is not what it was a few years past.

A complete record of amount and value of slate produced in California follows:

Year	Amount	Value
1889 -----	4,500 squares	\$18,089 00
1890 -----	4,000 squares	24,000 00
1891 -----	4,000 squares	24,000 00
1892 -----	3,500 squares	21,000 00
1893 -----	3,000 squares	21,000 00
1894 -----	1,800 squares	11,700 00
1895 -----	1,350 squares	9,450 00
1896 -----	500 squares	2,500 00
1897 -----	400 squares	2,800 00
1898 -----	400 squares	2,800 00
1899 -----	810 squares	5,900 00
1900 -----	3,500 squares	26,250 00
1901 -----	5,100 squares	38,250 00
1902 -----	4,000 squares	30,000 00
1903 -----	10,000 squares	70,000 00
1904 -----	6,000 squares	50,000 00
1905 -----	4,000 squares	40,000 00
1906 -----	10,000 squares	100,000 00
1907 -----	7,000 squares	60,000 00
1908 -----	6,000 squares	60,000 00
1909 -----	6,961 squares	45,660 00
1910 -----	1,000 squares	8,000 00
Totals -----	87,821 squares	\$671,399 00

Stone Industry.

Reference: State Mineralogist Report XII. Bulletin 38.

The classification "Stone Industry" is an arbitrary one and at first glance is a misnomer, because of the fact that it does not include all the "stone" produced in the State. For want of a better name, however, it will be used throughout this report as the title for that branch of the mineral industry covering crushed rock of all kinds, granite, paving blocks and sand and gravel. The foregoing are very closely related from the standpoint of the producer. The quarry which produces granite blocks this year may have a commercial output of crushed rock next, or its product may regularly consist of both classes of material. Thus it has been found to be most satisfactory to group these items as has been done in recent reports of this Bureau. In so far as it has been possible to do so, granite and crushed rock production has been subdivided into the various uses to which the product was put. It will be noted, however, that in both instances a very large percentage of the output has been tabulated under the heading "Unclassified." This is necessary because of the fact that many of the producers have no way of telling to what specific use their rock was put after they have quarried and sold the same.

One hundred and eighty-two quarries in forty-two counties reported a production of this class of material during 1913. Fully as many more quarries were idle for one cause or another. The 1913 output shows a total value of \$6,168,020, as compared with \$5,474,928 in 1912, an increase of \$694,092 or about 13 per cent.

As has been the case for several years past, Los Angeles County led all others by a wide margin, with an output valued at \$1,008,810; Contra Costa second with \$660,405; Riverside third, and Alameda fourth, both close to the half million mark. The total is made up of the following subdivisions—all values being for crude material at the property. The 1912 figures are given in each case for comparison:

	1913	1912	Increase	Decrease
Granite -----	\$981,277 00	\$362,975 00	\$618,302 00	-----
Paving block -----	363,505 00	578,355 00	-----	\$214,850 00
Crushed rock* -----	4,823,238 00	4,532,598 00	290,640 00	-----
Totals -----	\$6,168,020 00	\$5,473,928 00	\$908,942 00	\$214,850 00
Increase -----			\$694,092 00	-----

*Including sand and gravel.

Granite Production, by counties, for 1913.

County	Building stone		Monumental		Curbing		Unclassified	
	Cubic feet	Value	Cubic feet	Value	Lineal feet	Value	Cubic feet	Value
Fresno -----			10,137	\$29,500 00				
Humboldt -----			119	119 00			739,781	\$389,870 00
Imperial -----							25,000	12,000 00
Inyo -----							800	835 00
Lassen -----	9,600	\$1,680 00						
Madera -----	133,609	257,976 00	11,850	8,550 00	5,535	\$3,597 00		
Nevada -----	250	700 00	500	3,500 00	1,000	500 00	100	300 00
Placer -----	216	691 00	22,514	25,998 00	49,442	25,160 00	115,000	125,000 00
Plumas -----			800	500 00			400	200 00
Riverside -----	12,876	5,150 00	3,726	4,195 00	5,000	2,500 00	62,847	29,135 00
Sacramento -----	30,000	10,000 00					10,000	2,000 00
San Bernardino -----							11,000	11,290 00
San Diego -----	500	500 00	6,550	7,850 00			11,261	13,358 00
San Luis Obispo -----					535	134 00		
Santa Barbara -----	18,000	1,950 00						
Sonoma -----					21,887	2,189 00	(probably basalt)	
Tulare -----	800	1,300 00	3,200	3,050 00				
Totals -----	205,851	\$279,947 00	59,396	\$83,262 00	83,399	\$34,080 00	976,189	\$583,988 00

Paving Block Production, by counties, for 1913.

County	Amount	Value
Contra Costa -----	124 M	\$49,458 00
Los Angeles -----	395 M	25,214 00
Placer -----	421 M	13,443 00
Plumas -----	16 M	1,000 00
Riverside -----	1,903 M	103,088 00
Sacramento -----	20 M	450 00
San Bernardino -----	250 M	16,250 00
San Diego -----	474 M	27,855 00
Sonoma -----	2,761 M	126,747 00
Totals -----	6,364 M	\$363,505 00

Sand and Gravel Production, by counties, for 1913.

County	Moulding sand, fire sand, etc.		Amount	Value
Alameda -----	¹ 500 tons	\$1,125 00	651,253 tons	\$295,132 00
Amador -----	² 877 tons	670 00		
Butte -----			344,983 tons	31,379 00
Contra Costa -----			200,261 tons	55,887 00
El Dorado -----			300 tons	75 00
Fresno -----			141,994 tons	45,537 00
Glenn -----			416,640 tons	27,776 00
Humboldt -----			35,575 tons	25,075 00
Lassen -----			200 tons	350 00
Los Angeles -----			598,759 tons	160,966 00
Marin -----			100 tons	100 00
Mendocino -----			15,750 tons	9,450 00
Monterey -----			11,078 tons	11,876 00
Napa -----			206,264 tons	123,759 00
Orange -----			72,707 tons	15,815 00
Riverside -----			16,250 tons	4,100 00
Sacramento -----			250,164 tons	48,551 00
San Bernardino -----			15,000 tons	2,750 00
San Diego -----	¹ 3,149 tons	4,149 00	34,217 tons	13,537 00
San Francisco -----			35,600 tons	9,000 00
San Joaquin -----			1,800 tons	900 00
San Mateo -----			5,000 tons	2,000 00
Santa Barbara -----			12,000 tons	7,000 00
Santa Clara -----			7,008 tons	4,256 00
Siskiyou -----			48,830 tons	4,883 00
Sonoma -----	³ 271 tons	1,813 00	152,412 tons	48,495 00
Stanislaus -----			62,275 tons	14,482 00
Tehama -----			10,000 tons	500 00
Trinity -----			1,000 tons	1,000 00
Yuba -----			45,848 tons	8,063 00
Totals -----	4,797 tons	\$7,757 00	3,393,268 tons	\$972,694 00

¹Moulding sand.²Fire sand.³Chicken grit.

Crushed Rock Production, by counties, for 1913.

County	Macadam		Rubble		Concrete		Unclassified	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Alameda	207,745	\$123,478 00			55,868	\$32,401 00	7,903	\$3,928 00
Butte	133,451	80,423 00					426,652	227,124 00
Contra Costa	3,000	3,000 00	45,000	\$31,500 00	544,977	322,284 00	225,247	120,853 00
El Dorado	286,800	143,400 00			1,603	1,603 00		
Fresno	7,500	13,000 00			30,000	15,000 00	375,000	183,000 00
Humboldt	424,031	238,905 00	9,184	8,055 00			13,551	11,744 00
Los Angeles			7,330	1,466 00	93,937	86,670 00	779,228	489,000 00
Madera			421,032	193,400 00				
Marin					225	203 00	7,000	5,250 00
Merced							67,000	30,000 00
Monterey	600	500 00	200	180 00				
Napa	29,000	25,000 00	112,500	75,000 00			25,000	20,000 00
Orange	10,000	7,500 00			15,000	10,000 00	6,500	3,500 00
Placer	2,400	2,150 00	13,748	5,874 00			23,161	7,433 00
Riverside	179,962	104,983 00			20,000	15,000 00	410,598	268,693 00
Sacramento			20,000	3,000 00	4,100	3,200 00	337,245	171,275 00
San Benito	100,000	50,000 00			39,000	19,500 00	125,000	50,000 00
San Bernardino	17,924	5,977 00	11,418	4,846 00	14,259	8,534 00	345,519	314,665 00
San Diego					43,997	39,794 00	73,734	62,971 00
San Francisco	2,700	1,350 00	46,246	37,446 00	60,330	46,755 00	14,500	16,000 00
San Mateo	13,094	10,073 00	325	312 00	7,800	6,250 00		
Santa Barbara	2,500	2,500 00						
Santa Clara	59,974	25,121 00						
Santa Cruz	5,935	10,511 00						
Solano	35,376	28,915 00						
Sonoma	11,188	8,752 00					5,304	3,440 00
Tehama	150	100 00						
Totals	1,533,330	\$885,638 00	686,983	\$361,079 00	931,096	\$607,194 00	3,263,142	\$1,988,876 00

Total value of production of "Stone Industry," by counties, for 1913 and 1912 with increase or decrease in each instance.

County	1913	1912	Decrease	Increase
Alameda -----	\$456,064 00	\$420,283 00	-----	\$35,781 00
Amador -----	670 00	-----	-----	670 00
Butte -----	258,503 00	51,879 00	-----	206,624 00
Colusa -----	-----	15,300 00	\$15,300 00	-----
Contra Costa -----	660,405 00	478,162 00	-----	182,243 00
El Dorado -----	4,678 00	4,375 00	-----	303 00
Fresno -----	416,437 00	307,158 00	-----	109,279 00
Glenn -----	27,776 00	32,950 00	5,174 00	-----
Humboldt -----	439,808 00	229,730 00	-----	210,078 00
Imperial -----	12,000 00	10,000 00	-----	2,000 00
Inyo -----	835 00	648 00	-----	187 00
Lassen -----	2,030 00	-----	-----	2,030 00
Los Angeles -----	1,008,810 00	955,668 00	-----	53,142 00
Madera -----	271,589 00	59,271 00	-----	212,318 00
Marin -----	198,953 00	3,000 00	-----	195,953 00
Mendocino -----	9,450 00	300 00	-----	9,150 00
Merced -----	30,000 00	45,000 00	15,000 00	-----
Monterey -----	12,556 00	60,119 00	47,563 00	-----
Napa -----	243,759 00	172,646 00	-----	71,113 00
Nevada -----	5,000 00	3,675 00	-----	1,325 00
Orange -----	36,815 00	21,284 00	-----	15,531 00
Placer -----	205,749 00	231,415 00	25,666 00	-----
Plumas -----	1,700 00	1,350 00	-----	350 00
Riverside -----	536,844 00	567,309 00	30,465 00	-----
Sacramento -----	238,476 00	197,733 00	-----	40,743 00
San Benito -----	119,500 00	83,232 00	-----	36,268 00
San Bernardino -----	364,312 00	580,824 00	216,512 00	-----
San Diego -----	170,014 00	164,115 00	-----	5,899 00
San Francisco -----	110,551 00	151,147 00	40,596 00	-----
San Joaquin -----	900 00	-----	-----	900 00
San Luis Obispo -----	134 00	-----	-----	134 00
San Mateo -----	18,635 00	29,587 00	10,952 00	-----
Santa Barbara -----	11,450 00	17,480 00	6,030 00	-----
Santa Clara -----	29,377 00	48,228 00	18,851 00	-----
Santa Cruz -----	10,511 00	22,710 00	12,199 00	-----
Siskiyou -----	4,883 00	609 00	-----	4,274 00
Solano -----	28,915 00	130,445 00	101,530 00	-----
Sonoma -----	191,436 00	295,198 00	103,762 00	-----
Stanislaus -----	14,482 00	63,572 00	49,090 00	-----
Tehama -----	600 00	-----	-----	600 00
Trinity -----	1,000 00	2,000 00	1,000 00	-----
Tulare -----	4,350 00	-----	-----	4,350 00
Yuba -----	8,063 00	15,526 00	7,463 00	-----
Totals -----	\$6,168,020 00	\$5,473,928 00	-----	-----
Total increase -----	-----	-----	-----	\$694,092 00

CHAPTER FIVE.

INDUSTRIAL MATERIALS.

The following mineral substances have been arbitrarily arranged under the general heading of "Industrial Materials," as distinguished from those which have a clearly defined classification, such as Metals, Salines, Structural Materials, etc.

These materials, the majority of which are mineral earths, are produced on a comparatively small scale at the present time. Almost without exception the possibilities of development along these lines are practically unlimited and with increasing transportation, and other facilities, together with a steadily growing demand, the future for this branch of the mineral industry in California is indeed bright.

To date, production has been in the majority of instances dependent upon more or less of a strictly local market, and the following data will show the results of such a condition, not only in the widely varying amounts of a certain material produced from year to year, but in widely varying prices of the same material, often, in different sections of the State. Furthermore, the quality of this general class of material will be found to fluctuate, even in the same deposit, especially as regards price. Reports were received by the State Mining Bureau from 290 properties which were active in 1913, either in producing, or in making preparations to produce one or more of the following industrial materials. These properties are located in thirty-nine different counties of the State, from Siskiyou in the north, to San Diego in the south.

The following summary shows the value of the industrial materials produced in California during the years 1912-13 with increase or decrease in each instance:

Substance	1913	1912	Increase	Decrease
Asbestos -----	\$1,175 00	\$2,700 00	-----	\$1,525 00
Barytes -----	3,680 00	2,812 00	\$868 00	-----
Clay -----	261,273 00	215,683 00	45,590 00	-----
Feldspar -----	7,850 00	6,180 00	1,670 00	-----
Fuller's earth -----	3,700 00	6,500 00	-----	2,800 00
Gems -----	13,740 00	23,050 00	-----	9,310 00
Graphite -----	25 00	-----	25 00	-----
Gypsum -----	135,050 00	117,388 00	17,662 00	-----
Infusorial earth -----	35,968 00	17,074 00	18,894 00	-----
Limestone -----	274,455 00	570,248 00	-----	*295,793 00
Manganese -----	-----	400 00	-----	400 00
Mineral paint -----	1,780 00	1,800 00	-----	20 00
Mineral water -----	599,748 00	529,384 00	70,364 00	-----
Pumice -----	4,500 00	2,500 00	2,000 00	-----
Pyrites -----	218,537 00	203,470 00	15,067 00	-----
Quartz rock -----	7,756 00	-----	7,756 00	-----
Sand, glass -----	14,143 00	15,404 00	-----	1,261 00
Soapstone -----	6,150 00	7,350 00	-----	1,200 00
Totals -----	\$1,589,530 00	\$1,721,943 00	-----	-----

*The apparently large decrease as regards limestone is due to the fact that a more thorough analysis of the uses to which the product was put has been made in this

report than has been attempted in former years. An enormous quantity of limestone is annually consumed in the manufacture of cement; as the value of the cement production of the State is included in the total mineral production it is obviously a duplication of figures to also add the value of the limestone used in this way. It is believed that the value of limestone given above for 1913 has excluded all such duplication. Exclusive of this item the above summary shows, instead of the indicated decrease, an actual increase of \$163,380 in the value of the above mineral substances for 1913 over the 1912 production.

Asbestos.

Reference: State Mineralogist Reports XII, XIII. Bulletin 38.

Eight owners of asbestos properties filed reports for 1913 in the office of the State Mining Bureau, as follows:

Calaveras County.—One property; idle.

El Dorado County.—Two properties. Neither produced, although in one case several hundred pounds of material was stored on dump.

Placer County.—Two properties. Both companies did considerable development work during the year, but neither disposed of their product.

Shasta County.—One property. Uncovered a considerable deposit of various varieties of asbestos. Shipped 47 tons to experimental plant in Oakland, where the fiber was manufactured into different commercial articles. Average value per ton at the property \$25.

Sierra County.—One property. Possess a good grade fiber, but lack transportation facilities. Development work only.

Production, 1913, 47 tons; value, \$1,175.

Production, 1912, 90 tons; value, \$2,700.

The real history of the development and use of asbestos dates back only about sixty years. Since that time the investigation as to its occurrence, uses, and methods of treatment has been continuous, and its application to every day life has grown with wonderful rapidity. The first mill built to handle the crude ore and extract the fiber on a large scale by machinery was constructed in 1888.

The first production of asbestos in California was in 1887 when 30 tons were mined, having a crude value of \$60 per ton, according to the State Mining Bureau reports.

The bulk of the world's supply of this mineral to-day comes from Canada, and Canadian asbestos, so far, leads in quality as well as in quantity.

The word "asbestos" as used here includes several minerals, from a strict mineralogical standpoint, which grade into the well known rock, serpentine. The asbestos minerals are of a fibrous structure, in many cases the fiber being so fine and elastic that it can be woven after the manner of wool. Chemically, asbestos is a silicate of calcium, aluminum and magnesium. Soapstone, which is an alteration product of serpentine, commonly occurs in the vicinity of asbestos deposits.

To bring the highest market price asbestos must needs have a combination of properties, *i. e.*, length and fineness of fiber, tensile strength and flexibility—all combined with infusibility. Of these qualities the most important are toughness and infusibility and determination of the same can only be made by practical tests or in the laboratory. Given several specimens of the same tensile strength and degree of infusibility the one having the longest fiber will, of course, be of the greatest value. It must be kept in mind, however, that length of fiber alone, the characteristic which most naturally appeals to the eye, is not the final test in regard to the commercial value of the find and much short fiber asbestos, which on first appearance is of inferior grade, is being sold, and profitably handled at the present time.

The largest Canadian asbestos deposits are worked as open quarries where the ore is roughly sorted before being sent to the mill to be dressed for the market. This method has been found to be cheaper and more satisfactory in every way.

The milling of asbestos ore, while more or less complicated in actual practice, is easy to understand and has one well defined object in view. That is the complete eradication of all foreign rock ingredients and the thorough cleaning and separation of the fibers.

Asbestos, roughly speaking, is worth from \$20 to \$200 per ton. The poorer grades which are unsuitable for weaving, and which, of course, command the lower prices, are used in the manufacture of steam packing, furnace linings, asbestos brick, wall plasters, paints, tilings, asbestos board, insulating material, etc. The better grades are utilized in the manufacture of tapestries of various kinds, fireproof theater curtains, cloth, rope, etc.

A very important development of the asbestos industry is the rapidly increasing demand for the lower grade material, on account of the numerous diversified uses to which asbestos products are being put, in almost every branch of manufacture. This fact means that many deposits of asbestos will become commercially important even though the grade of the material is far from the best.

It has been discovered only recently that not only does an asbestos wall plaster render the wall so covered impervious to heat, but that in rooms which have given forth an undesirable echo this evil has been absolutely removed. Asbestos pulp mixed with cement and magnesite has been experimented with in the East, and roofing, flooring, and other building material of the most satisfactory sort has been manufactured therefrom.

The domestic production of asbestos has an approximate value of \$100,000 annually. The imports, largely from Canada, for 1911 amounted to \$1,318,539, according to the annual report on Commerce

and Navigation, issued by the Department of Commerce and Labor. The above value is for crude material; adding the imported manufactured asbestos articles the figure amounts to \$1,703,639.

With the field for development along these lines which is open in California, it seems almost certain that some time in the future will see this branch of the mineral industry adding its share to the total of the wealth and productiveness of this State.

Total amount and value of asbestos production in California since 1887 as given in the records of this Bureau, are as follows:

Year	Amount	Value
1887 -----	30 tons	\$1,800 00
1888 -----	30 tons	1,800 00
1889 -----	30 tons	1,800 00
1890 -----	71 tons	4,260 00
1891 -----	66 tons	3,960 00
1892 -----	30 tons	1,830 00
1893 -----	50 tons	2,500 00
1894 -----	50 tons	2,250 00
1895 -----	25 tons	1,000 00
1898 -----	10 tons	200 00
1899 -----	30 tons	750 00
1900 -----	50 tons	1,250 00
1901 -----	110 tons	4,400 00
1904 -----	10 tons	162 00
1905 -----	112 tons	2,625 00
1906 -----	70 tons	3,500 00
1907 -----	70 tons	3,500 00
1908 -----	70 tons	6,100 00
1909 -----	65 tons	6,500 00
1910 -----	200 tons	20,000 00
1911 -----	125 tons	500 00
1912 -----	90 tons	2,700 00
1913 -----	47 tons	1,175 00
Totals -----	1,441 tons	\$74,562 00

Barytes.

Reference: State Mineralogist Report XII. Bulletin 38.

Three producers reported a total output of crude barytes during 1913 of 1,600 tons valued at \$3,680, as compared with the 1912 production of 564 tons worth \$2,812. This indicates a spot value of only \$2.30 per ton for the 1913 product. As a matter of fact barytes is ordinarily sorted and ground before being put on the market, and in this prepared condition brings approximately \$10 to \$14 per ton. The principal use of this material is in the paint industry. Minor uses are in tanning of leather, manufacture of paper and rope, and sugar refining.

Known deposits of this mineral in California are located in Butte, Mariposa, San Bernardino, Shasta, Calaveras, Inyo, and Nevada counties.

Bauxite.

Reference: Bulletin 38.

No deposits of pure bauxite have been discovered in the State although from time to time small quantities of the impure material have been the foundation of extravagant reports regarding such discoveries. In 1912 a company was incorporated and work of developing such a deposit was outlined, but close investigation proved the futility of such effort.

According to Bulletin 67, of this Bureau, bauxite of uncertain quality has been found at Smartsville, Yuba County.

Clay.

Reference: State Mineralogist Reports I, IV, IX, XII. Bulletin 38.

At one time or another in the history of the State, pottery clay has been quarried in thirty-three of its counties. In this report "pottery clay" refers to all clays used in the manufacture of red and brown earthenware, flower pots, tiling of all descriptions, architectural terra cotta, sewer pipe, etc., and the figures for amount and value are relative to the crude material at the pit, without reference to whether the clay was sold in the crude form, or whether it was immediately used in the manufacture of any of the above finished products by the producer.

During 1913 twenty-two producers in thirteen counties reported a production of 231,179 tons of clay having a spot value of \$261,273 for the crude material, as compared with the 1912 production of 199,605 tons worth \$215,683, or an increase of 31,574 tons in amount, and of \$45,590 in value. Seven hundred men, in round numbers, were employed in this industry during the year.

A tabulation of the direct returns from the producers, by counties, for the year 1913 is shown herewith:

County	Amount	Value
Alameda -----	3,000 tons	\$2,700 00
Amador -----	39,678 tons	38,653 00
Calaveras -----	2,000 tons	4,500 00
Kern -----	208 tons	104 00
Los Angeles -----	7,425 tons	20,135 00
Monterey -----	3,500 tons	12,000 00
Orange -----	15,500 tons	20,666 00
Placer -----	63,600 tons	47,200 00
Riverside -----	88,936 tons	89,963 00
San Diego -----	838 tons	2,840 00
San Joaquin -----	1,494 tons	*18,522 00
San Mateo -----	2,000 tons	1,000 00
Ventura -----	3,000 tons	2,990 00
Totals -----	231,179 tons	\$261,273 00

*High grade fire clay.

Amount and value of clay output in California since 1887, are given in the following table:

Year	Amount	Value
1887 -----	75,000 tons	\$37,500 00
1888 -----	75,000 tons	37,500 00
1889 -----	75,000 tons	37,500 00
1890 -----	100,000 tons	50,000 00
1891 -----	100,000 tons	50,000 00
1892 -----	100,000 tons	50,000 00
1893 -----	24,856 tons	67,284 00
1894 -----	28,475 tons	35,073 00
1895 -----	37,660 tons	39,685 00
1896 -----	41,907 tons	62,900 00
1897 -----	24,592 tons	30,290 00
1898 -----	28,947 tons	33,747 00
1899 -----	40,600 tons	42,700 00
1900 -----	59,636 tons	60,956 00
1901 -----	55,679 tons	39,144 00
1902 -----	67,933 tons	74,163 00
1903 -----	90,972 tons	99,907 00
1904 -----	84,149 tons	81,952 00
1905 -----	133,805 tons	130,146 00
1906 -----	167,267 tons	162,283 00
1907 -----	160,385 tons	254,454 00
1908 -----	208,042 tons	325,147 00
1909 -----	299,424 tons	465,647 00
1910 -----	249,028 tons	324,099 00
1911 -----	224,576 tons	252,759 00
1912 -----	199,605 tons	215,683 00
1913 -----	231,179 tons	261,273 00
Totals -----	2,983,717 tons	\$3,321,792 00

Feldspar.

During the year 1913 seven producers, all located in Monterey and Tulare counties, reported an output of 2,129 tons of feldspar, valued at \$7,850, as compared with the 1912 production of 1,382 tons worth \$6,180. Values for the crude material at the property.

Feldspar production only dates back to 1910, in this State; the mineral is a constituent of practically all rocks, but can only be commercially produced from pegmatites where the crystals are large and quite free from impurities. The open cut method of mining this material is commonly used. During 1913 nineteen men were employed in the quarries. Manufacturers of enamel wares and pottery buy most of the better grades of feldspar produced. Small quantities are used in the manufacture of glass and scouring soaps, and the more impure material is utilized as "chicken grit," in making various brands of roofing, and in other ways. Various experiments have been made with the potash feldspars in the attempt to prove their value as a fertilizer with more or less negative results.

Total amount and value of feldspar production in California since the inception of the industry are given in the following table, by years:

Year	Amount	Value
1910 -----	760 tons	\$5,720 00
1911 -----	740 tons	4,560 00
1912 -----	1,382 tons	6,180 00
1913 -----	2,129 tons	7,850 00
Totals -----	5,011 tons	\$24,310 00

Fuller's Earth.

Reference: Bulletin 38.

Fuller's earth production in California during the year 1913 amounted to 460 tons, valued at \$3,700, as compared with 876 tons worth \$6,500 in 1912. Three properties produced the above amount and four properties were inactive during the year.

This material is soft and friable, and, in general, resembles a clay. It has no definite mineralogical composition and its commercial value is determined by its physical properties, *i. e.*, texture, and filtering and absorbent properties.

In California Fuller's earth is used principally in clarifying refined mineral oils, although its first use was in fulling wool as the name indicates. It was first discovered in this State in 1899, and the total amount and value of the production since that time are as follows:

Year	Amount	Value
1899 -----	620 tons	\$12,400 00
1900 -----	500 tons	3,750 00
1901 -----	1,000 tons	19,500 00
1902 -----	987 tons	19,246 00
1903 -----	250 tons	4,750 00
1904 -----	500 tons	9,500 00
1905 -----	1,344 tons	38,000 00
1906 -----	440 tons	10,500 00
1907 -----	100 tons	1,000 00
1908 -----	50 tons	1,000 00
1909 -----	459 tons	7,385 00
1910 -----	340 tons	3,820 00
1911 -----	466 tons	5,294 00
1912 -----	876 tons	6,500 00
1913 -----	460 tons	3,700 00
Totals -----	8,392 tons	\$146,345 00

Gems.

Reference: Bulletins 37, 64, 67. State Mineralogist Report II.

California is rich in her possession of gem minerals. San Diego County leads all sections of the State in this regard, although this class

of material is widely distributed throughout the State. The above references give in detail the kinds of gems, minerals, and their distribution, therefore no attempt will be made here to consider the subject beyond the point of actual production.

The following table gives the value of crude gems sold during 1913 by county, with a note of the principal variety in each instance:

County	Amount	
Butte -----	\$175 00	Diamonds.
Los Angeles -----	2,500 00	Beach stones (estimate).
Riverside -----	1,000 00	Tourmaline, beryl, etc. (estimate).
San Bernardino --	550 00	Turquoise and matrix.
San Diego -----	7,465 00	Tourmaline, beryl, hyacinth, kunzite, etc. (partial estimate).
San Mateo -----	300 00	Beach stones.
Siskiyou -----	250 00	Californite, rhodonite, etc.
Tulare -----	1,500 00	Satelite, bloodstone, etc. (estimate).
Total -----	\$13,740 00	

The above is the closest possible approximation of the value of the CRUDE gems mined in California during 1913. It is particularly difficult to get accurate information regarding this branch of the mineral industry—the supply of practically all classes of gem stones exceeds the demand and the amount produced, as well as the price which the crude material brings, fluctuates with the passing fancies of the buying public, which is made up in this case very largely of the tourist population. The year 1910 marked a high-water point of the gem industry in California, and one of the causes of its consistent decline since may be attributed to the great overproduction of that year. Large supplies of uncut stones mined during 1910 are still on hand at the shops of various dealers throughout the State. Returns for 1913 were received by this Bureau from thirty companies owning gem properties; less than half that number actually produced during that time. The above figures are made up from these returns taken together with estimates obtained by a representative of the Bureau from the leading dealers, who handle a large part of the annual output before it is placed on sale in a finished state.

The value of the total gem production in California annually since the beginning of commercial production is as follows:

Year	Value
1900 -----	\$20,500 00
1901 -----	40,000 00
1902 -----	162,100 00
1903 -----	110,500 00
1904 -----	136,000 00
1905 -----	148,500 00
1906 -----	497,090 00
1907 -----	232,642 00
1908 -----	208,950 00
1909 -----	193,700 00
1910 -----	237,475 00
1911 -----	51,824 00
1912 -----	23,050 00
1913 -----	13,740 00
Total -----	\$2,076,071 00

Graphite.

Reference: State Mineralogist Report XIII.

Calaveras County produced 2,500 pounds of graphite during the year 1913, having a spot value of \$20 per ton. The output was used in the paint industry and is the first commercial production of graphite recorded in the State since 1901-2. This mineral has been discovered in various localities in California but none of the deposits have been developed and the fact that the local supply is unreliable, both in quantity and quality, makes the large consumers look to foreign markets almost entirely.

The annual graphite production of the United States amounts to about \$250,000; the yearly imports have a value of approximately two million dollars. These facts show the possibilities which are open to this branch of the mineral industry provided, of course, that investigation would show sufficient amounts of high grade material to compete with the imported article, which at the present time comes largely from Ceylon. Low grade ores are concentrated with considerable difficulty and the electric process of manufacturing artificial graphite from coal has been perfected to such a degree that only deposits of natural graphite of a superior quality can be exploited with any certainty of success.

On account of its infusibility and resistance to the action of molten metals graphite is very valuable. It is also largely used in the manufacture of electrical appliances, of lead pencils, as a lubricant and in many other ways. Amorphous or "lump" graphite, commonly carrying many impurities, is worth as low as \$10 a ton. For some purposes such as foundry facings, etc., the low grade material is very satisfactory.

The price increases with the grade of the material until the best quality crystalline variety, ranges as high as \$200 per ton.

Occurrence of graphite has been reported at various times from Calaveras, Fresno, Los Angeles, Mendocino, San Bernardino, Siskiyou, Sonoma, and Tuolumne counties.

Total production in California to date is given herewith.

Year	Amount	Value
1901 -----	128,000 lbs.	\$4,480 00
1902 -----	84,000 lbs.	1,680 00
1913 -----	2,500 lbs.	25 00
Totals -----	214,500 lbs.	\$6,185 00

Gypsum.

Reference: Bulletins 38, 67.

According to reports from individual operators there were seven gypsum properties actively worked during 1913 in California and as many idle during that time. Deposits of this mineral are known in thirty counties of the State, and detailed information regarding same may be obtained from the above references. Actual production came from five counties, as noted below, with a total of 47,100 tons valued at \$135,050, or an average of \$2.87 spot value, per ton, as compared with the 1912 output of 37,529 tons worth \$117,388. This is an increase of 9,571 tons, in amount, and \$17,662 in value.

Gypsum is used in the manufacture of wall plaster and plaster of paris, in the paper and glass industries, and to some extent as a fertilizer. The material as produced in California carries more or less impurity and strictly speaking is termed gypsite. It is usually ground and calcined before marketing. Pure crystalline gypsum is called selenite, and the fibrous variety is known as satin spar. Chemically the mineral is a hydrous calcium sulphate and is commonly white to light brown in color.

Detailed county production figures are shown in the following tabulation:

County	Amount	Value
Kern -----	10,000 tons	\$22,750 00
Kings -----	100 tons	300 00
Monterey -----	11,000 tons	35,000 00
Riverside -----	1,000 tons	3,000 00
San Bernardino -----	25,000 tons	74,000 00
Totals -----	47,100 tons	\$135,050 00

Total annual production of gypsum in California since such records have been compiled by this Bureau is as follows:

Year	Amount	Value
1887 -----	2,700 tons	\$27,000 00
1888 -----	2,500 tons	25,000 00
1889 -----	3,000 tons	30,000 00
1890 -----	3,000 tons	30,000 00
1891 -----	2,000 tons	20,000 00
1892 -----	2,000 tons	20,000 00
1893 -----	1,620 tons	14,280 00
1894 -----	2,446 tons	24,584 00
1895 -----	5,158 tons	51,014 00
1896 -----	1,310 tons	12,580 00
1897 -----	2,200 tons	19,250 00
1898 -----	3,100 tons	23,600 00
1899 -----	3,663 tons	14,950 00
1900 -----	2,522 tons	10,088 00
1901 -----	3,875 tons	38,750 00
1902 -----	10,200 tons	53,500 00
1903 -----	6,914 tons	46,441 00
1904 -----	8,350 tons	56,592 00
1905 -----	12,850 tons	54,500 00
1906 -----	21,000 tons	69,000 00
1907 -----	8,900 tons	57,700 00
1908 -----	34,600 tons	155,400 00
1909 -----	30,700 tons	138,176 00
1910 -----	45,294 tons	129,152 00
1911 -----	31,457 tons	101,475 00
1912 -----	37,529 tons	117,388 00
1913 -----	47,100 tons	135,050 00
Totals -----	335,988 tons	\$1,475,470 00

Infusorial Earth.

Reference: State Mineralogist Reports II, XII, XIII. Bulletin 38.

Infusorial, or diatomaceous, earth—sometimes called tripolite—is a very light and extremely porous chalk-like material composed of pure silica which has been laid down under water and consists of the remains of microscopical infusoria called diatoms. Its principal commercial use is as an absorbent. It is also a first-class non-conductor of heat, is used in the manufacture of scouring soap and polishing powders, and in making some classes of refractory brick. The most important deposits in California thus far known are located in Los Angeles, Monterey, Orange, San Benito, San Bernardino, San Luis Obispo, Santa Barbara, Shasta, and Tehama counties.

During 1913 there were three actively operated quarries producing this material and four additional properties were idle.

Production during that time amounted to 8,645 tons valued at \$35,968 as compared with the 1912 output of 4,129 tons worth \$17,074, or an

increase in amount of 4,516 tons, and in value of \$18,894. The average value per ton during 1913, as shown by the above figures, was \$4.16. This value is for the crude material at the property. A total of 76 men were employed in the operating of the three active quarries.

Distribution by county is shown in the following table:

County	Amount	Value
Monterey -----	1,700 tons	\$6,800 00
Santa Barbara -----	6,895 tons	28,960 00
Sonoma -----	50 tons	208 00
Totals -----	8,645 tons	\$35,968 00

The first recorded production of this material in California occurred in 1889; total amount and value of output, to date, are as follows:

Year	Amount	Value
1889 -----	39 tons	\$1,335 00
1893 -----	50 tons	2,000 00
1894 -----	51 tons	2,040 00
1897 -----	5 tons	200 00
1902 -----	422 tons	2,532 00
1903 -----	2,703 tons	16,015 00
1904 -----	6,950 tons	112,282 00
1905 -----	3,000 tons	15,000 00
1906 -----	2,430 tons	14,400 00
1907 -----	2,531 tons	28,948 00
1908 -----	2,950 tons	32,012 00
1909 -----	500 tons	3,500 00
1910 -----	1,843 tons	17,617 00
1911 -----	2,194 tons	19,670 00
1912 -----	4,129 tons	17,074 00
1913 -----	8,645 tons	35,968 00
Totals -----	38,442 tons	\$320,593 00

It will be noted that the average price varies widely from year to year. This fact is true in case of many of the industrial materials. The quality of the product fluctuates, as does the demand; when both are favorable the maximum price obtains.

Limestone.

Reference: State Mineralogist Reports IV, XII. Bulletin 38.

Seventeen quarries, in ten counties as shown below, produced 301,918 tons of limestone during 1913 having a spot value of \$274,455. This includes only amount of limestone used as such—as a flux by smelters, in sugar refining, in the manufacture of carbonic acid, in the

manufacture of glass, paper and mineral wool, as a fertilizer for "sour" soils, and in other ways. Over 800,000 tons were used in the manufacture of cement. This figure is not included here because the value of the lime rock is included in the figures for cement production and a duplication is thus avoided. A considerable amount of limestone is annually utilized as macadam—such amounts have been likewise excluded from the above total.

As compared with the 1912 figures showing a limestone output of 613,375 tons worth \$570,248, the year 1913 shows an alarming decrease. As a matter of fact this discrepancy is due to the fact that a more thorough analysis of the uses to which the product was put has been made in the present report than was attempted in former years, and it is believed that the 1913 figures show absolutely no duplication.

According to the records filed in the office of the State Mining Bureau there were idle quarries in Butte, Fresno, Orange, Plumas, Los Angeles, San Benito, San Luis Obispo, Siskiyou, and Ventura counties, in addition to the active properties noted in the following tabulation. Two hundred and thirty-six men were employed in the operation of the seventeen active quarries.

Distribution by county of the 1913 output is as follows:

County	Amount	Value
Calaveras -----	2,000 tons	\$1,400 00
Contra Costa -----	26,259 tons	34,976 00
Monterey -----	6,500 tons	13,000 00
San Bernardino -----	25,896 tons	35,464 00
San Mateo -----	138,544 tons	78,506 00
Santa Barbara -----	5,884 tons	19,623 00
Santa Clara -----	3,549 tons	4,200 00
Santa Cruz -----	39,494 tons	30,994 00
Shasta -----	41,346 tons	35,616 00
Tuolumne -----	12,446 tons	20,676 00
Totals -----	301,918 tons	\$274,455 00

In the early reports of this Bureau values for lime and limestone were not segregated. The following tabulation shows the total combined value of such material since records for the State were first compiled, in 1887, to date:

Year	Value
1887	\$368,750 00
1888	381,750 00
1889	416,780 00
1890	350,000 00
1891	300,000 00
1892	300,000 00
1893	301,276 00
1894	337,975 00
1895	457,784 00
1896	332,617 00
1897	291,465 00
1898	278,558 00
1899	343,760 00
1900	315,231 00
1901	434,133 00
1902	460,140 00
1903	582,268 00
1904	658,956 00
1905	878,647 00
1906	925,887 00
1907	1,162,417 00
1908	676,507 00
1909	997,745 00
1910	1,058,891 00
1911	843,778 00
1912	1,034,688 00
1913	803,002 00
Total	\$15,293,005 00

Manganese.

Reference: State Mineralogist Reports XII, XIII. Bulletins 38, 67.

Reports were returned to this Bureau by nine owners of manganese properties located in Alameda, Glenn, Placer, Plumas, San Benito, Sonoma, and Stanislaus counties. Merely the assessment work was done in each case, no commercial production having been made during 1913. Manganese is used in the steel industry, in the manufacture of paint, glass, pottery, in the chemical laboratory, etc. Local demand is very small.

With the exception of 1913 there has been a nominal production of manganese ore in California annually since 1887, as follows:

Year	Amount	Value
1887 -----	1,000 tons	\$9,000 00
1888 -----	1,500 tons	13,500 00
1889 -----	53 tons	901 00
1890 -----	386 tons	3,176 00
1891 -----	705 tons	3,830 00
1892 -----	300 tons	3,000 00
1893 -----	270 tons	4,050 00
1894 -----	523 tons	5,512 00
1895 -----	880 tons	8,200 00
1896 -----	518 tons	3,415 00
1897 -----	504 tons	4,030 00
1898 -----	440 tons	2,102 00
1899 -----	295 tons	3,165 00
1900 -----	131 tons	1,310 00
1901 -----	425 tons	4,405 00
1902 -----	870 tons	7,140 00
1903 -----	1 ton	25 00
1904 -----	60 tons	900 00
1906 -----	1 ton	30 00
1907 -----	1 ton	25 00
1908 -----	321 tons	5,785 00
1909 -----	3 tons	75 00
1910 -----	265 tons	4,235 00
1911 -----	2 tons	40 00
1912 -----	22 tons	400 00
1913 -----		
Totals -----	9,476 tons	\$88,301 00

Mica.

Reference: State Mineralogist Report II. Bulletin 38.

Mica of commercial value has been found to a very limited extent in California. The total actual production, as shown by the records of the State Mining Bureau, is as follows:

Year	Amount	Value
1902 -----	50 tons	\$2,500 00
1903 -----	50 tons	3,800 00
1904 -----	50 tons	3,000 00
Totals -----	150 tons	\$9,300 00

Lithia mica, utilized in the manufacture of artificial mineral water, fire-works, etc., was mined and sold in San Diego County during the years 1899-1905 inclusive, but there has been no commercial production since the latter date. Four properties reported a small amount of development work during the year 1913, but nothing further.

Lithia mica total production in the State is as follows:

Year	Amount	Value
1899 -----	124 tons	\$4,600 00
1900 -----	440 tons	11,000 00
1901 -----	1,100 tons	27,500 00
1902 -----	822 tons	31,880 00
1903 -----	700 tons	27,300 00
1904 -----	641 tons	25,000 00
1905 -----	25 tons	276 00
Totals -----	3,852 tons	\$127,556 00

Mineral Paint.

Reference: State Mineralogist Reports XII, XIII. Bulletin 38.

Reports from four producers of mineral paint, out of a total of thirteen properties in the State, show a production of 303 tons valued at \$1,780 for the year 1913, almost a duplication of the 1912 output of 300 tons worth \$1,800. Deposits of more or less importance are located in Calaveras, Kern, Los Angeles, Kings, Nevada, Riverside, Sonoma, and Stanislaus counties.

Distribution of production for 1913 is as follows:

County	Amount	Value
Calaveras -----	28 tons	\$190 00
Kings -----	20 tons	60 00
Stanislaus -----	255 tons	1,530 00
Totals -----	303 tons	\$1,780 00

The first recorded production of this material in the State was in the year 1890. Production, showing annual amount and value, to date since that time is given herewith:

Year	Amount	Value
1890 -----	40 tons	\$480 00
1891 -----	22 tons	880 00
1892 -----	25 tons	750 00
1893 -----	590 tons	26,795 00
1894 -----	610 tons	14,140 00
1895 -----	750 tons	8,425 00
1896 -----	395 tons	5,540 00
1897 -----	578 tons	8,165 00
1898 -----	653 tons	9,698 00
1899 -----	1,704 tons	20,294 00
1900 -----	529 tons	3,993 00
1901 -----	325 tons	875 00
1902 -----	589 tons	1,533 00
1903 -----	2,370 tons	3,720 00
1904 -----	270 tons	1,985 00

Year	Amount	Value
1905 -----	754 tons	\$4,025 00
1906 -----	250 tons	1,720 00
1907 -----	250 tons	1,720 00
1908 -----	335 tons	2,250 00
1909 -----	305 tons	2,325 00
1910 -----	200 tons	2,040 00
1911 -----	186 tons	1,184 00
1912 -----	300 tons	1,800 00
1913 -----	303 tons	1,780 00
Totals -----	12,333 tons	\$126,117 00

Mineral Water.

Reference: State Mineralogist Reports VI, XII, XIII.

Twenty-one counties reported a commercial production of mineral water from forty-seven springs during the year 1913 to the amount of 2,350,792 gallons, valued at \$599,748, or an average of 2½ cents per gallon, as compared with the 1912 output of 2,497,794 gallons, worth \$529,384, or an average of 2.1 cents. This is a decrease in amount of 147,002 gallons, and an increase in value of \$70,364.

These figures refer to mineral water actually bottled and sold. Water from some of the springs having a decided medicinal value bring a price many times higher than the average shown above, while in some cases the water is used merely for drinking purposes and sells for a nominal figure.

Detailed production figures for 1913 are as follows:

County	Amount	Value
Butte -----	1,000 gals.	\$250 00
Calaveras -----	11,500 gals.	5,500 00
Colusa -----	132,720 gals.	32,931 00
Contra Costa -----	192,292 gals.	4,989 00
Lake -----	209,750 gals.	109,938 00
Los Angeles -----	254,095 gals.	15,140 00
Marin -----	60,000 gals.	9,000 00
Monterey -----	20,000 gals.	7,000 00
Napa -----	151,520 gals.	75,548 00
Riverside -----	200,000 gals.	20,000 00
San Benito -----	7,000 gals.	4,500 00
San Bernardino -----	4,500 gals.	3,000 00
San Diego -----	41,500 gals.	15,225 00
San Luis Obispo -----	1,500 gals.	600 00
Santa Barbara -----	112,500 gals.	108,135 00
Santa Clara -----	101,000 gals.	10,750 00
Shasta -----	30,000 gals.	6,850 00
Siskiyou -----	700,000 gals.	120,000 00
Solano -----	23,600 gals.	3,440 00
Sonoma -----	96,240 gals.	46,910 00
Tehama -----	75 gals.	42 00
Totals -----	2,350,792 gals.	\$599,748 00

Amount and value of mineral water produced in California since 1887 are given herewith:

Year	Amount	Value
1887 -----	618,162 gals.	\$144,368 00
1888 -----	1,112,202 gals.	252,990 00
1889 -----	808,625 gals.	252,241 00
1890 -----	258,722 gals.	89,786 00
1891 -----	334,553 gals.	139,959 00
1892 -----	331,875 gals.	162,019 00
1893 -----	383,179 gals.	90,667 00
1894 -----	402,275 gals.	184,481 00
1895 -----	701,397 gals.	291,500 00
1896 -----	808,843 gals.	337,434 00
1897 -----	1,508,192 gals.	345,863 00
1898 -----	1,429,809 gals.	213,817 00
1899 -----	1,338,537 gals.	406,691 00
1900 -----	2,456,115 gals.	268,607 00
1901 -----	1,555,328 gals.	559,057 00
1902 -----	1,701,142 gals.	612,477 00
1903 -----	2,056,340 gals.	558,201 00
1904 -----	2,430,320 gals.	496,946 00
1905 -----	2,194,150 gals.	538,700 00
1906 -----	1,585,690 gals.	478,186 00
1907 -----	2,924,269 gals.	544,016 00
1908 -----	2,789,715 gals.	560,507 00
1909 -----	2,449,834 gals.	465,488 00
1910 -----	2,335,259 gals.	522,009 00
1911 -----	2,637,669 gals.	590,654 00
1912 -----	2,497,794 gals.	529,384 00
1913 -----	2,350,792 gals.	599,748 00
Totals -----	42,000,788 gals.	\$10,235,796 00

Pumice.

Reference: State Mineralogist Report XII (see Tufa). Bulletin 38.

Deposits of pumice stone are located in Inyo, Napa, San Bernardino, and Siskiyou counties, which have been developed to some extent.

The 1913 output was as follows:

County	Amount	Value	
Napa County -----	70,000 cu. ft.	\$2,500 00	Used as building stone. Scoria and ash—used for abrasive purposes.
Siskiyou County -----	90 tons	2,000 00	
Total -----	-----	\$4,500 00	

The 1912 production of pumice was valued at \$2,500. There was, therefore, an increase in value of \$2,000 for 1913 in regard to this class of material.

Pyrite.*Reference: Bulletin 38.*

Pyrite production in California during 1913 amounted to 79,000 tons, the value of the crude ore at the property being \$218,537, or at the rate of \$2.77 per ton. This is an increase, as shown by the following table, over the total production and value for the past two years, but is a decrease in the value per ton, which was \$2.91 in 1912, and \$3.37 in 1911.

These figures refer to pyrite actually sold and used in the manufacture of sulphuric acid, and take no account of the thousands of tons of pyritic ores which are treated for other than their sulphur content. The output here referred to comes from Alameda and Shasta counties, as has been the case since the inception of this branch of the mineral industry in California in 1898.

The annual imports of pyrite far exceed the domestic production, and the yearly output is steadily increasing thereby proving that a strong demand for this class of material holds.

California's output by county for the past three years is as follows:

Year	County	Amount	Value
1911-----	Alameda -----	6,340 tons	\$31,352 00
1911-----	Shasta -----	47,885 tons	151,602 00
	Totals -----	54,225 tons	\$182,954 00
1912-----	Alameda -----	7,267 tons	29,068 00
1912-----	Shasta -----	62,605 tons	174,402 00
	Totals -----	69,872 tons	\$203,470 00
1913-----	Alameda -----	6,029 tons	24,128 00
1913-----	Shasta -----	72,971 tons	194,409 00
	Totals -----	79,000 tons	\$218,537 00

The total production in California to date is as follows:

Year	Amount	Value
1898 -----	6,000 tons	\$30,000 00
1899 -----	5,400 tons	28,620 00
1900 -----	3,642 tons	21,133 00
1901 -----	4,578 tons	18,429 00
1902 -----	17,525 tons	60,306 00
1903 -----	24,311 tons	94,000 00
1904 -----	15,043 tons	62,992 00
1905 -----	15,503 tons	63,958 00
1906 -----	46,689 tons	145,895 00
1907 -----	82,270 tons	251,774 00
1908 -----	107,081 tons	610,335 00
1909 -----	457,867 tons	1,389,802 00
1910 -----	42,621 tons	179,862 00
1911 -----	54,225 tons	182,954 00
1912 -----	69,872 tons	203,470 00
1913 -----	79,000 tons	218,537 00
Totals -----	1,031,627 tons	\$3,562,067 00

Quartz.

Quartz production in California during the calendar year 1913 amounted to 4,040 tons valued at \$7,756. Distribution by county is shown below:

County	Amount	Value
Amador -----	1,960 tons	\$3,556 00
Placer -----	2,000 tons	4,000 00
Tulare -----	80 tons	200 00
Totals -----	4,040 tons	\$7,756 00

Sand, Glass.

Reference: State Mineralogist Report IX (*see* Glass). Bulletin 38.

Practically all the glass sand produced in California occurs as such and needs no grinding. There are various deposits of quartz which could be utilized for glass making, but to date there is no commercial production of this class of material.

Glass sand has been produced in the following counties of the State: Alameda, El Dorado, Los Angeles, Monterey, Orange, Placer, Riverside, San Joaquin, and Tulare. The chief producing centers are Monterey and Los Angeles counties. The industry is of little importance, so far, because of the fact that the available deposits are not of a grade which will produce first-class glass. Many high grade deposits are known, but almost without exception transportation facilities are so poor that the owners are unable to compete with the foreign sand which is brought in as ballast, and sold at a low price. There were five producers in California in 1913.

Production for 1913 was as follows:

County	Amount	Value
Amador -----	877 tons	\$670 00
Los Angeles -----	1,800 tons	2,000 00
Monterey -----	8,901 tons	7,473 00
San Joaquin -----	3,000 tons	4,000 00
Totals -----	14,578 tons	\$14,143 00

Total glass sand production in California since the inception of the industry in 1899, is shown below:

Year	Amount	Value
1899 -----	2,000 tons	\$2,000 00
1900 -----	2,000 tons	2,000 00
1901 -----	4,500 tons	15,750 00
1902 -----	4,500 tons	12,225 00
1903 -----	7,725 tons	7,725 00
1904 -----	10,004 tons	12,276 00
1905 -----	9,257 tons	8,121 00
1906 -----	9,750 tons	13,375 00
1907 -----	11,065 tons	8,178 00
1908 -----	9,255 tons	22,045 00
1909 -----	12,259 tons	25,517 00
1910 -----	9,124 tons	8,165 00
1911 -----	8,620 tons	8,672 00
1912 -----	13,075 tons	15,404 00
1913 -----	14,578 tons	14,143 00
Totals -----	127,712 tons	\$175,596 00

Soapstone.

Reference: State Mineralogist Report XII. Bulletins 38, 67.

Soapstone—also called Talc or Steatite—occurs widely distributed throughout California. Few deposits have been proven of especial value to date, although there is an undoubted future for this branch of the mineral industry in the State. The 1913 production came from Amador and Inyo counties, and amounted to 1,350 tons, valued at \$6,150, as compared with the 1912 output of 1,750 tons worth \$7,350. It is used in making paper, soap, lubricants, tiling, etc., and is ordinarily ground to about 200 mesh before marketing. In this condition it brings about \$15 per ton.

Production has been intermittent in the State since 1893, as shown in the following table:

Year	Amount	Value
1893 -----	400 tons	\$17,750 00
1895 -----	25 tons	375 00
1901 -----	10 tons	119 00
1902 -----	14 tons	288 00
1903 -----	219 tons	10,124 00
1904 -----	228 tons	2,315 00
1905 -----	300 tons	3,000 00
1908 -----	3 tons	48 00
1909 -----	33 tons	280 00
1910 -----	740 tons	7,260 00
1912 -----	1,750 tons	7,350 00
1913 -----	1,350 tons	6,150 00
Totals -----	5,072 tons	\$55,059 00

Sulphur.

Reference: State Mineralogist Reports IV, XIII. Bulletins 38, 67.

There is no commercial output of native sulphur in California although this mineral has been found to some extent in Colusa, Imperial, Inyo, Kern, Lake, Mariposa, San Bernardino, Sonoma, Tehama, and Ventura counties. Above references give detailed information as to location, etc. Production of sulphur is very improbable, in the immediate future, although possibilities of such a condition remain to be proven.

CHAPTER SIX.

SALINES.

Reference: Bulletin 24.

Borax, salt, soda, nitrates and potash are included under this heading. Borax and salt have been produced in California since the sixties, although no official records of output were kept by this Bureau previous to 1887. Soda has had a virtually continuous production since 1894. The nitrates and potash have never been commercially produced in the State although the future possibilities along these lines are indeed great.

The desert portions of California, located largely in Inyo, Kern, Riverside, Imperial, and San Bernardino counties are rich in the possession of salines of all descriptions. Ancient lake beds of vast extent are found there, many of which have never yet been exploited to any extent.

The following tabulation shows amount and value of the saline minerals produced in California during the years 1912 and 1913, with increase or decrease in value for 1913 as compared with the previous year:

Substance	1912		1913		Increase (+) or decrease (—)
	Amount	Value	Amount	Value	
Borax -----	42,135 tons	\$1,122,713 00	58,051 tons	\$1,491,530 00	+ \$368,817 00
Salt -----	185,721 tons	383,370 00	204,407 tons	462,681 00	+ 79,311 00
Soda -----	7,200 tons	37,094 00	1,861 tons	24,936 00	— 12,158 00
Totals-----	-----	\$1,543,177 00	-----	\$1,979,147 00	+ \$435,970 00

Borax.

Reference: State Mineralogist Reports III, X, XII, XIII.

Borax was first discovered in California in the waters of Tuscan Springs in Tehama County, January 8, 1856. Borax Lake, in Kern County, was discovered in September of the same year, by Dr. John A. Veatch. This deposit was worked in 1864-65-66 and during that time produced 1,181,365 pounds of borax. Not till 1873 were the borax deposits of Inyo and San Bernardino counties discovered.

Aside from the above mentioned localities borax is known in Lake, Los Angeles, Imperial, Solano, and Ventura counties.

California is the sole source of domestic borax. The 1913 production amounted to 58,051 tons of crude ore containing borax to the value of \$1,491,530, as compared with the 1912 output of 42,135 tons worth \$1,122,713.

Value of the State's borax output since 1887 is shown in the following table:

Year	Value	Year	Value
1887 -----	\$116,689 00	1902 -----	\$2,234,994 00
1888 -----	196,636 00	1903 -----	661,400 00
1889 -----	145,473 00	1904 -----	698,810 00
1890 -----	480,152 00	1905 -----	1,019,158 00
1891 -----	640,000 00	1906 -----	1,182,410 00
1892 -----	838,787 00	1907 -----	1,200,913 00
1893 -----	593,292 00	1908 -----	1,117,000 00
1894 -----	807,807 00	1909 -----	1,163,960 00
1895 -----	595,900 00	1910 -----	1,177,960 00
1896 -----	675,400 00	1911 -----	1,456,672 00
1897 -----	1,080,000 00	1912 -----	1,122,713 00
1898 -----	1,153,000 00	1913 -----	1,491,530 00
1899 -----	1,139,882 00		
1900 -----	1,013,251 00		
1901 -----	982,380 00		
		Total -----	\$24,986,169 00

Nitrates.

Nitrates of sodium, potassium and calcium have been found in various places in the desert regions of the State but no deposit of commercial value has been located as yet. Interest in this class of mineral substance is increasing and closer search may be rewarded by valuable discoveries.

Potash.

Potash has never been commercially produced in California and only during the past few years has this substance created general interest in the State. Considerable money has been spent recently in preliminary work with a view toward developing what are claimed to be immense deposits of potash which lie in the old lake beds of the desert portions of California. The imports of this material from foreign countries have an annual value of many millions of dollars, and a domestic production would be of great value.

Salt.

Reference: State Mineralogist Reports II, XII, XIII.

Most of the salt produced in California is obtained by evaporating the waters of the Pacific Ocean, plants being located on the shores of San Francisco Bay, at Long Beach, and at San Diego. Additional amounts are derived from lakes and lake beds in the desert regions of the State, and from deposits of rock salt which are found extensively in San Bernardino County.

During 1913 salt was produced in the State to the total amount of 204,407 tons, valued at \$462,681, as compared with the 1912 output of 185,721 tons worth \$383,370, an increase of 18,686 tons in amount and of \$79,311 in value. The increase is due almost entirely to the returns from Inyo County, which produced for the first time in 1913, and to an increased production in San Diego County. The output of Alameda,

Los Angeles, and San Bernardino was almost identical with that of 1912 and a decrease occurred in San Mateo County due to floods resulting from storms which took place during the last months of the year. From the present outlook the damage done as a result of the high water will be still more apparent in the returns for 1914. The salt production of San Bernardino County is derived from deposits of rock salt which are worked by means of quarrying with a steam shovel. A small amount of valuable medicinal salts was produced during the year in Mono and Tehama counties, by evaporation from mineral springs, but as the material was not sold during 1913 the figures have not been included in this report.

Distribution by counties is given herewith:

County	Amount	Value
Alameda -----	129,318 tons	\$233,388 00
Inyo -----	13,500 tons	54,000 00
Los Angeles -----	10,000 tons	40,000 00
Modoc -----	40 tons	720 00
San Bernardino -----	3,049 tons	10,573 00
San Diego -----	20,500 tons	51,750 00
San Mateo -----	28,600 tons	72,250 00
Totals -----	204,407 tons	\$462,681 00

Amount and value of annual production of salt in California from 1887 to date is shown in the following tabulation:

Year	Amount	Value
1887 -----	28,000 tons	\$112,000 00
1888 -----	30,800 tons	92,400 00
1889 -----	21,000 tons	63,000 00
1890 -----	8,729 tons	57,085 00
1891 -----	20,094 tons	90,303 00
1892 -----	23,570 tons	104,788 00
1893 -----	50,500 tons	213,000 00
1894 -----	49,131 tons	140,087 00
1895 -----	53,031 tons	150,576 00
1896 -----	64,743 tons	153,244 00
1897 -----	67,851 tons	157,520 00
1898 -----	93,421 tons	170,855 00
1899 -----	82,654 tons	149,588 00
1900 -----	89,338 tons	204,754 00
1901 -----	126,218 tons	366,376 00
1902 -----	115,208 tons	205,876 00
1903 -----	102,895 tons	211,365 00
1904 -----	95,968 tons	187,300 00
1905 -----	77,118 tons	141,925 00
1906 -----	101,650 tons	213,228 00
1907 -----	88,063 tons	310,967 00
1908 -----	121,764 tons	281,469 00
1909 -----	155,680 tons	414,708 00
1910 -----	174,920 tons	395,417 00
1911 -----	173,332 tons	324,255 00
1912 -----	185,721 tons	383,370 00
1913 -----	204,407 tons	462,681 00
Totals -----	2,405,806 tons	\$5,758,137 00

Soda.

Reference: State Mineralogist Reports XII, XIII.

Production of soda in California during the year 1913 amounted to 1,861 tons, valued at \$24,936, as compared with the 1912 output of 7,200 tons worth \$37,094. The total output, showing amount and value, of this product since the inception of this branch of the mineral industry in California is given in the table which follows:

Year	Amount	Value
1894 -----	1,530 tons	\$20,000 00
1895 -----	1,900 tons	47,500 00
1896 -----	3,000 tons	65,000 00
1897 -----	5,000 tons	110,000 00
1898 -----	7,000 tons	154,000 00
1899 -----	10,000 tons	250,000 00
1900 -----	1,000 tons	50,000 00
1901 -----	8,000 tons	400,000 00
1902 -----	7,000 tons	50,000 00
1903 -----	18,000 tons	27,000 00
1904 -----	12,000 tons	18,000 00
1905 -----	15,000 tons	22,500 00
1906 -----	12,000 tons	18,000 00
1908 -----	9,600 tons	14,400 00
1909 -----	7,712 tons	11,593 00
1910 -----	8,125 tons	11,862 00
1911 -----	9,023 tons	52,887 00
1912 -----	7,200 tons	37,094 00
1913 -----	1,861 tons	24,936 00
Totals -----	144,951 tons	\$1,384,772 00

CHAPTER SEVEN.

MINERAL PRODUCTION OF CALIFORNIA BY COUNTIES.

Introductory.

The State of California includes an area of 155,652 square miles and is divided into fifty-eight counties. Some mineral of commercial value exists in every county, and during 1913 active production was reported to the State Mining Bureau from fifty-six counties of the fifty-eight. In the mountainous portions of the State are found the vein forming minerals, largely. In the vast desert regions of southeastern California ancient lake beds afford an unlimited supply of saline deposits. Underlying the interior valleys of the central and southern portion of the State are the largest pools of crude oil in the world. Building stones and mineral earths of all descriptions are widely distributed throughout the length and breadth of the State.

The counties, with their mineral resources, production for 1913, etc., will be considered in detail in this chapter.

Value of California Mineral Production, by County, for 1913, Arranged in the Order of their Importance.

1. Kern	\$28,406,193 00	32. Marin	\$278,453 00
2. Fresno	8,438,810 00	33. Stanislaus	272,249 00
3. Orange	6,948,495 00	34. Mariposa	246,079 00
4. Shasta	6,212,344 00	35. Sonoma	239,037 00
5. Los Angeles	5,833,298 00	36. San Mateo	215,371 00
6. Santa Barbara	3,636,288 00	37. Mono	184,428 00
7. Amador	3,013,180 00	38. Monterey	178,679 00
8. Nevada	2,950,367 00	39. San Joaquin	165,157 00
9. Sacramento	2,925,706 00	40. Plumas	143,698 00
10. Butte	2,533,940 00	41. Lake	125,829 00
11. Yuba	2,507,139 00	42. Tulare	119,760 00
12. San Bernardino	2,486,100 00	43. San Francisco	110,551 00
13. Riverside	2,071,969 00	44. Imperial	95,054 00
14. Calaveras	2,042,901 00	45. El Dorado	67,723 00
15. Contra Costa	1,962,640 00	46. San Luis Obispo	63,675 00
16. Inyo	1,942,309 00	47. Colusa	48,481 00
17. Solano	1,839,721 00	48. Merced	35,329 00
18. Santa Cruz	1,816,805 00	49. Glenn	27,776 00
19. Tuolumne	1,198,383 00	50. Mendocino	9,450 00
20. Napa	1,186,353 00	51. Modoc	6,875 00
21. Sierra	1,010,976 00	52. Del Norte	2,514 00
22. Ventura	924,972 00	53. Tehama	2,442 00
23. Alameda	844,217 00	54. Lassen	2,382 00
24. Placer	520,808 00	55. Kings	1,335 00
25. San Benito	514,995 00	56. Alpine	541 00
26. Humboldt	471,052 00	57. Sutter	
27. Trinity	435,142 00	58. Yolo	
28. Madera	371,867 00	Unapportioned	17,738 00
29. San Diego	315,694 00		
30. Santa Clara	311,383 00		
31. Siskiyou	309,986 00	Total	\$98,644,639 00

Alameda.

Alameda County, while in no sense one of the "mining counties" of the State, comes twenty-third on the list with a value of mineral products for 1913 of \$844,217, a marked increase over the 1912 total, which was \$794,961. The principal mineral resources of this county consist in brick, chromite, clay, coal, lime, magnesite, manganese, pyrite, salt, soapstone, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	13,977 M	\$122,937 00
Clay -----	3,000 tons	2,700 00
Lime -----	5,000 bbls.	5,000 00
Pyrite -----	6,029 tons	24,128 00
Salt -----	129,318 tons	233,388 00
Stone industry* -----		456,064 00
Total -----		\$844,217 00

*See page 42.

Alpine.

Reference: State Mineralogist Report XII.

Alpine stands last on the list of producing counties in regard to the value of its mineral output for 1913, which consisted of gold and silver to the value of \$541.

This county lies just south of Lake Tahoe in the high Sierra Nevada range of mountains. Its area is 776 square miles, containing a population of but 309 persons. Transportation is by wagon or mule back, and facilities in general are lacking to promote development work of any kind.

The mineral resources of this section are varied and the country has not yet been thoroughly prospected. Barium, copper, gold, gypsum, lead, limestone, pyrite, rose quartz, silver, tourmaline, and zinc have been found here to some extent.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Gold -----		\$537 00
Silver -----		4 00
Total -----		\$541 00

Amador.

Reference: State Mineralogist Report VI.

Area: 601 square miles.

Population: 9,086 (1910 census).

The value of Amador County's mineral production increased from \$2,925,202 in 1912 to \$3,013,180 in 1913, thus taking seventh place on the list of counties in the State, as regards total value of mineral substances marketed.

Although having an output consisting of twelve different minerals, the leading product, gold, makes up fully 95 per cent of the entire total. Amador is second in the State in gold production.

The mineral resources of this county are in the main as follows: asbestos, brick, chromite, clay, coal, copper, gold, lime, quartz crystals, sand-glass, sandstone, silver, soapstone, and stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	2,000 M	\$30,000 00
Clay -----	39,678 tons	38,653 00
Copper -----	19,023 lbs.	2,949 00
Gold -----		2,901,898 00
Lime -----	1,000 bbls.	1,200 00
Quartz -----	1,960 tons	3,556 00
Sand-glass -----	877 tons	670 00
Sandstone -----	2,500 cu.ft.	2,500 00
Silver -----		18,097 00
Soapstone -----	350 tons	1,750 00
Stone Industry* -----		670 00
Other minerals -----		11,237 00
Total -----		\$3,013,180 00

*See page 42.

Butte.

Reference: State Mineralogist Report VI.

Area: 1,722 square miles.

Population: 27,301 (1910 census).

Location: North central portion of State.

Butte, tenth county in California in regard to the value of its mineral output, reported a commercial production of five mineral substances having a total value of \$2,533,940 for 1913, as compared with \$2,403,675 for 1912. As will be noted in the following tabulation, gold is by far the most important item. Butte stands fifth among the gold producing counties of the State. Among the principal mineral resources of this section are asbestos, barytes, chromite, gems, gold, limestone, marble, mineral water, platinum minerals, silver, and stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Gems -----		\$175 00
Gold -----		2,269,849 00
Mineral water -----	1,000 gals.	250 00
Silver -----		5,163 00
Stone industry* -----		258,503 00
Total -----		\$2,533,940 00

*See page 42.

Calaveras.

Reference: State Mineralogist Reports VI, XII.

Area: 1,027 square miles.

Population: 9,171.

Location: East central portion of State—Mother Lode district.

Calaveras County reported production of ten different minerals valued at \$2,042,901 during the year 1913, as compared with the 1912 output, worth \$2,051,781. Gold, copper and silver are the chief mineral substances produced. In regard to total value of mineral output Calaveras stands fourteenth among the counties of the State; it is seventh in gold and second in copper and third in silver.

The principal mineral resources developed and undeveloped are: Asbestos, barytes, chromite, clay, copper, gold, graphite, limestone, magnesite, marble, mineral paint, mineral water, platinum minerals, pyrite, quartz crystals, silver, soapstone, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Clay -----	2,000 tons	\$4,500 00
Copper -----	5,063,187 lbs.	784,794 00
Gold -----		1,175,208 00
Graphite -----	2,500 lbs.	25 00
Lead -----	7,006 lbs.	308 00
Limestone -----	2,000 tons	1,400 00
Mineral paint -----	28 tons	190 00
Mineral water -----	11,500 gals.	5,500 00
Silver -----		61,076 00
Other minerals -----		9,900 00
Total -----		\$2,042,901 00

Colusa.

Reference: State Mineralogist Report XI.

Area: 1,140 square miles.

Population: 7,732 (1910 census).

Location: Sacramento Valley.

Colusa County lies largely in the basin of the Sacramento Valley. Its western border, however, rises into the foothills of the Coast Range of mountains, and its mineral resources, to a great extent undeveloped, include coal, chromite, copper, gypsum, manganese, mineral water, pyrite, quicksilver, sandstone, stone industry, sulphur, and in some places traces of gold and silver.

The value of the 1913 production was \$48,481, a considerable decline from the 1912 figures of \$70,165.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Mineral water -----	132,720 gals.	\$32,931 00
Sandstone -----	34,927 cu.ft.	15,550 00
Total -----		\$48,481 00

Contra Costa.

Contra Costa, like Alameda County, lies off the eastern shores of San Francisco Bay and is not commonly considered among the mineral producing counties of the State. It stands fifteenth on the list in this respect, however, with an output valued at \$1,962,640 for the calendar year 1913. Various structural materials make up the chief items. Among the others are brick, clay, coal, gypsum, limestone, manganese, mineral water, soapstone, and stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	30,411 M	\$212,953 00
Lime -----	150,551 bbls.	127,968 00
Limestone -----	26,259 tons	34,976 00
Mineral water -----	192,292 gals.	4,989 00
Stone industry* -----		660,405 00
Other minerals -----		921,349 00
Total -----		\$1,962,640 00

*See page 42.

Del Norte.

Area: 1,024 square miles.

Population: 2,417 (1910 census).

Location: Extreme northwest corner of State.

Transportation: Wagon and mule back.

Del Norte rivals Alpine County in regard to inaccessibility. Like the latter county, also, given transportation and kindred facilities and this portion of the State presents a wide field for development along mining lines especially. Its chief mineral resources, largely untouched, are chromite, copper, gems, gold, graphite, iron, platinum minerals, silver and stone industry.

Commercial production for 1913 was as follows:

Substance	Value
Gold -----	\$2,498 00
Silver -----	16 00
Total -----	\$2,514 00

El Dorado.

Reference: State Mineralogist Reports VI, XII.

Area: 1,753 square miles.

Population: 7,492 (1910 census).

Location: East central portion of the State northernmost of the Mother Lode counties.

El Dorado County, which marks the spot where gold was first discovered in California, comes forty-fifth on the list of counties ranked according to the value of their total mineral production during the year 1913. The principal mineral resources of this section, many of them undeveloped are: Asbestos, barytes, chromite, clay, copper, gems, gold, iron, molybdenum, limestone, quartz crystals, quicksilver, sand-glass, slate, soapstone, silver, and stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Copper -----	693 lbs.	\$107 00
Gold -----		62,688 00
Silver -----		250 00
Stone industry* -----		4,678 00
Total -----		\$67,723 00

*See page 42.

Fresno.

Reference: State Mineralogist Report VI.

Area: 5,950 square miles.

Population: 75,657 (1910 census).

Location: South central portion of State.

Fresno County, second in importance as a mineral producer among the counties of California, reported an output for 1913 of eight mineral substances with a total value of \$8,438,810, a slight decrease from the 1912 production, which was worth \$8,897,685. The great bulk of the above value is derived from the petroleum production of the Coalinga field.

The mineral resources of this county are many and, aside from crude oil, are far from being fully developed; they include asbestos, barytes, brick, chromite, copper, gems, gold, graphite, gypsum, iron, magnesite, natural gas, petroleum, quicksilver, silver, and stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	5,500 M	\$44,000 00
Gold -----		2,846 00
Magnesite -----	1,135 tons	9,080 00
Natural gas -----	236,100 M	23,610 00
Petroleum -----	18,956,965 bbls.	7,927,736 00
Quicksilver -----	375 flasks	15,086 00
Silver -----		15 00
Stone industry* -----		416,437 00
Total -----		\$8,438,810 00

*See page 42.

Glenn.

Glenn County owes its position among the mineral producing counties of the State to the presence of large deposits of sand and gravel which are annually worked, the product being used for railroad ballast, etc. In the foothills in the western portion of the county traces of chromite, copper, manganese, sandstone, and soapstone have been found.

Commercial production for 1913 was as follows:

Substance	Value
Stone industry* -----	\$27,776 00
Total -----	\$27,776 00

*See page 42.

Humboldt.

Area: 3,634 square miles.

Population: 33,857 (1910 census).

Location: Northwestern portion of State, bordering on Pacific Ocean.

Humboldt County is almost entirely mountainous, transportation within its limits is very largely by wagon road and trail, and until recently was reached from the outside world by steamer only. The county is rich in mineral resources, chief among which are brick, chromite, coal, clay, copper, gold, graphite, iron, mineral water, natural gas, petroleum, platinum, silver, and stone industry.

Six mineral substances, as shown by the table given below, having a total value of \$471,052, were produced in 1913, as compared with the 1912 output, worth \$268,116. Humboldt ranks twenty-sixth among the counties of the State for the year.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	500 M	\$4,150 00
Copper -----	7,750 lbs.	1,201 00
Gold -----		25,611 00
Natural gas -----		150 00
Silver -----		132 00
Stone industry* -----		439,808 00
Total -----		\$471,052 00

*See page 42.

Imperial.

Area: 4,089 square miles.

Population: 30,000 (estimated by board of supervisors).

Location: Extreme southeast corner of the State.

During 1913 Imperial County produced five mineral substances having a total value of \$95,054, as compared with the 1912 output, worth \$30,000. This county contains large undeveloped deposits of gold, gypsum, lead, marble, salt, and silver.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	5,500 M	\$44,000 00
Gold -----		31,700 00
Marble -----	750 cu. ft.	7,260 00
Silver -----		94 00
Stone industry* -----		12,000 00
Total -----		\$95,054 00

*See page 42.

Inyo.

Reference: State Mineralogist Reports VIII, XII.

Area: 10,019 square miles.

Population: 6,974 (1910 census).

Location: Lies on eastern border of State, north of San Bernardino County.

Inyo, the second largest county in the State and containing less than one inhabitant per square mile, is extremely interesting from a mineralogical point of view. It is noted because of the fact that within its borders are located both the highest point, Mount Whitney (elevation 14,502 feet), and the lowest point, Death Valley (elevation 290 feet below sea level), in the United States. In the higher mountainous sections are found many vein forming minerals and in the ancient lake beds of Death Valley saline deposits of all kinds exist.

Inyo's mineral production during the year 1913 reached a value of \$1,942,309, the county standing sixteenth among the counties of the State in this respect. Its mineral resources include antimony, asbestos, barytes, bismuth, borax, copper, gems, gold, gypsum, lead, magnesite, marble, molybdenum, mineral water, nitre, platinum, quicksilver, salt, soapstone, silver, soda, sulphur, tungsten, and zinc.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Copper -----	113,860 lbs.	\$17,648 00
Gold -----		237,310 00
Lead -----	3,322,308 lbs.	146,182 00
Marble -----	3,200 cu. ft.	11,500 00
Salt -----	13,500 tons	54,000 00
Silver -----		136,854 00
Soapstone -----	1,000 tons	4,400 00
Stone industry* -----		835 00
Other minerals -----		1,333,580 00
Total -----		\$1,942,309 00

*See page 42.

Kern.

Reference: State Mineralogist Report VIII.

Area: 8,003 square miles.

Population: 55,000 (estimated by board of supervisors).

Location: South central portion of State.

Kern County, because of its immense productive oil fields, stands preeminent among all counties of California in the value of its mineral output, the exact figures for 1913 being \$28,406,193. This is larger by twenty million dollars than the succeeding county on the list. This figure also exceeds the value of the total gold output of the entire State

by approximately \$8,000,000. The 1912 mineral output for the county was worth \$23,097,003; thus it will be noted that the growth of the mineral industry in Kern County alone had a value of \$5,309,190.

Among the mineral resources, developed and undeveloped, of this section are antimony, asbestos, asphalt, barite, borax, brick, clay, copper, fuller's earth, gems, gold, gypsum, iron, lead, limestone, magnesite, marble, mineral paint, natural gas, petroleum, potash, salt, silver, soapstone, soda, sulphur, and tungsten.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	1,625 M	\$22,000 00
Clay -----	208 tons	104 00
Copper -----	3,498 lbs.	542 00
Gold -----		649,712 00
Gypsum -----	10,000 tons	22,750 00
Lead -----	1,376 lbs.	61 00
Lime -----	135,000 bbls.	91,200 00
Natural gas -----	7,111,237 M	568,899 00
Petroleum -----	58,698,432 bbls.	27,038,474 00
Silver -----		11,851 00
Other minerals -----		600 00
Total -----		\$28,406,193 00

Kings.

Area: 1,159 square miles.

Population: 16,230 (1910 census).

Location: South central portion of State.

Little development has taken place in Kings County along mineral lines to date. Deposits of fuller's earth, gypsum, mineral paint, natural gas and quicksilver, of undetermined extent, have been found in the county.

Commercial production during 1913 was as follows:

Substance	Amount	Value
Gypsum -----	100 tons	\$300 00
Mineral paint -----	20 tons	60 00
Natural gas -----	1,916 M	575 00
Other minerals -----		400 00
Total -----		\$1,335 00

Lake.

Reference: State Mineralogist Report XI.

Area: 1,278 square miles.

Population: 5,526 (1910 census).

Location: About fifty miles north of San Francisco Bay and the same distance inland from the Pacific Ocean.

On account of its topography and natural beauties, Lake County is sometimes referred to as the Switzerland of America. The mineral resources which exist here are many and varied, actual production being comparatively small, as shown by the table below. Some of the leading minerals found in this section are borax, chromite, clay, gems, gypsum, mineral water, quicksilver, and sulphur.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Mineral water -----	209,750 gals.	\$109,938 00
Quicksilver -----	395 flasks	15,891 00
Total -----		\$125,829 00

Lassen.

Reference: State Mineralogist Reports VIII, IX.

Area: 4,531 square miles.

Population: 7,000 (estimated by board of supervisors, 1913).

Location: Northeast portion of State.

Lassen County is one of the least explored sections of California. Within the past couple of years a railroad traversing the county north and south has been put in operation, thus affording opportunity for development along mineral and other lines.

Among the mineral resources of this county are copper, gems, gypsum, gold, silver, and sulphur.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Copper -----	2,259 lbs.	\$350 00
Silver -----		2 00
Stone industry* -----		2,030 00
Total -----		\$2,382 00

*See page 42.

Los Angeles.

Reference: State Mineralogist Reports VIII, IX.

Area: 4,067 square miles.

Population: 800,000 (estimated by Chamber of Commerce, 1913).

Mineral production in Los Angeles County for the year 1913 amounted in value to \$5,833,298, as compared with the 1912 output, worth \$5,594,513. This county ranks fifth in the State as a mineral producer.

Its output of petroleum, brick, and crushed rock each had a value in excess of a million dollars. Among its leading mineral resources may be noted asphalt, barytes, borax, brick, chromite, clay, copper, fuller's earth, gems, gold, gypsum, infusorial earth, iron, limestone, marble, mineral paint, mineral water, natural gas, petroleum, salt, sand-glass, sandstone, serpentine, silver, soapstone, and stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	204,912 M	\$1,752,106 00
Clay -----	7,425 tons	20,135 00
Gems -----		2,500 00
Gold -----		2,322 00
Mineral water -----	255,095 gals.	15,140 00
Natural gas -----	1,287,794 M	77,578 00
Petroleum -----	4,143,690 bbls.	2,672,680 00
Salt -----	10,000 tons	40,000 00
Sand-glass -----	1,800 tons	2,000 00
Silver -----		27 00
Stone industry* -----		1,008,810 00
Other minerals -----		240,000 00
Total -----		\$5,833,298 00

*See page 42.

Madera.

Reference: State Mineralogist Report XII.

Area: 2,112 square miles.

Population: 15,000 (estimated by Chamber of Commerce, 1913).

Location: East central portion of State.

Madera County produced five mineral substances during the year 1913 having a total value of \$371,867, as compared with the 1912 output, worth \$112,285. This county contains deposits of copper, gold, iron, lead, molybdenum, silver, and building stone.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	315 M	\$1,650 00
Copper -----	532,403 lbs.	82,522 00
Gold -----		14,489 00
Silver -----		1,617 00
Stone industry* -----		271,589 00
Total -----		\$371,867 00

*See page 42.

Marin.

Area: 529 square miles.

Population: 25,114 (1910 census).

Mineral production in Marin County during the year 1913 reached a value of \$278,453, as compared to the 1912 output, worth \$122,200. This county is not especially prolific in minerals, although among its resources along these lines are asbestos, brick, gems, mineral water, and soapstone.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	16,000 M	\$70,500 00
Mineral water -----	60,000 gals.	9,000 00
Stone industry* -----		198,953 00
Total -----		\$278,453 00

*See page 42.

Mariposa.

Reference: State Mineralogist Report XII.

Area: 1,463 square miles.

Population: 3,956 (1910 census).

Location: Most southerly of the Mother Lode counties. East central portion of State.

Mariposa County is one of the distinctly "mining" counties of the State, although it stands thirty-fourth on the list of counties in regard to the value of its mineral output for 1913, with a total of \$246,079. This is a considerable increase over the 1912 figures of \$214,294.

Its mineral resources are varied, among the more important items being asbestos, barytes, copper, gems, gold, lead, marble, silver, slate, soapstone, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Copper -----	416,031 lbs.	\$64,485 00
Gold -----		171,034 00
Silver -----		7,430 00
Other minerals -----		3,130 00
Total -----		\$246,079 00

Mendocino.

Area: 3,453 square miles.

Population: 23,929 (1910 census).

Location: Joins Humboldt County on the north and the Pacific Ocean on the west.

Mendocino County's annual mineral production is quite small, although the 1913 output, valued at \$9,450, exceeded many times the 1912 production, worth \$300. In each case crushed rock was the material commercially produced. Deposits of uncertain value of chromite, copper, graphite, magnesite, and mineral water have been found, as well as traces of gold and silver.

Commercial production for 1913 was as follows:

Substance	Value
Stone industry* -----	\$9,450 00
Total -----	\$9,450 00

*See page 42.

Merced.

Area: 1,995 square miles.

Population: 15,148 (1910 census).

Location: About the geographical center of the State.

Merced County as a whole lies in the San Joaquin Valley and it figures as one of the lesser mineral producing counties of the State. The 1913 mineral output was valued at \$35,329, derived from the production of copper, gold, silver, and crushed rock. Undeveloped deposits of antimony, quicksilver, and limestone have been noted in this county in addition to the foregoing.

Commercial production during 1913 was as follows:

Substance	Amount	Value
Copper -----	19,240 lbs.	\$2,982 00
Gold† -----		2,255 00
Silver† -----		92 00
Stone industry* -----		30,000 00
Total -----		\$35,329 00

*See page 42

†Production from dredging operations included in Stanislaus County.

Modoc.

Area: 3,823 square miles.

Population: 6,191 (1910 census).

Location: The extreme northeast corner of the State.

Modoc County, like Lassen, has only recently had the benefit of communication with the outside world by rail. It is at the present time, generally speaking, an unexplored country. Among its known mineral resources are clay, coal, gold, iron, quicksilver, salt, and silver.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Gold -----		\$6,061 00
Salt -----	40 tons	720 00
Silver -----		94 00
Total -----		\$6,875 00

Mono.

Reference: State Mineralogist Reports VIII, XII.

Area: 3,030 square miles.

Population: 2,843 (1910 census).

Location: Is bordered by the State of Nevada on the east and is about in the central portion of the State measured on a north and south line.

Gold mining has been carried on in portions of Mono County for many years, although taken as a whole it lies in a very inaccessible country and has been but superficially explored. It is in the continuation of the highly mineralized belt which was noted in Inyo County and contains among other mineral resources barytes, bismuth, clay, copper, gold, gypsum, iron, lead, limestone, silver, and travertine.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Copper -----	79,319 lbs.	\$12,294 00
Gold -----		147,271 00
Lime -----	2,135 bbls.	1,600 00
Silver -----		23,263 00
Total -----		\$184,428 00

Monterey.

Reference: State Mineralogist Reports VI, X.

Area: 3,330 square miles.

Population: 24,146 (1910 census).

Location: West central portion of State, bordering on Pacific Ocean.

Monterey County produced twelve mineral substances during the year 1913 having a total value of \$178,679, as compared with the 1912 output, worth \$132,749. Its mineral resources include brick, clay, copper, coal, feldspar, fuller's earth, gold, gypsum, infusorial earth, limestone, mineral water, petroleum, quicksilver, sand-glass, sandstone, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Clay -----	35,000 tons	\$12,000 00
Gold -----		6,491 00
Gypsum -----	11,000 tons	35,000 00
Infusorial earth -----	1,700 tons	6,800 00
Limestone -----	6,500 tons	13,000 00
Mineral water -----	20,000 gals.	7,000 00
Sand-glass -----	8,901 tons	7,473 00
Silver -----		27 00
Stone industry* -----		12,556 00
Other minerals -----		78,332 00
Total -----		\$178,679 00

*See page 42.

Napa.

Reference: State Mineralogist Report XI.

Area: 783 square miles.

Population: 19,800 (1910 census).

Location: Directly north of San Francisco Bay—one of the "bay counties."

Napa, because of its production of structural and industrial materials, stands twentieth on the list of mineral producing counties in California. Its most important mineral resources are asbestos, barytes, copper, cement, gypsum, magnesite, mineral water, quicksilver, sandstone, soapstone, and stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Mineral water -----	151,520 gals.	\$75,548 00
Pumice stone -----	70,000 cu. ft.	2,500 00
Quicksilver -----	287 flasks	11,546 00
Sandstone -----	20,000 cu. ft.	8,000 00
Stone industry* -----		243,759 00
Other minerals -----		845,000 00
Total -----		\$1,186,353 00

*See page 42.

Nevada.

Reference: State Mineralogist Reports VI, X.

Area: 974 square miles.

Population: 14,955 (1910 census).

Location: North of Lake Tahoe on the eastern border of the State.

Nevada, one of the mountain counties of California, leads all others in its gold output for 1913 and stands eighth on the list in regard to the value of its total mineral output with a figure of \$2,950,367, as compared with the 1912 production, worth \$2,108,543.

While this county actually produces little else in the mineral line aside from gold and silver, its resources cover a wide scope, including asbestos, baryte, bismuth, chromite, clay, copper, gems, iron, lead, magnesite, mineral paint, pyrite, soapstone, and tungsten.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Gold -----		\$2,918,733 00
Lead -----	2,090 lbs.	92 00
Silver -----		26,542 00
Stone industry* -----		5,000 00
Total -----		\$2,950,367 00

*See page 42.

Orange.

Reference: State Mineralogist Reports X, XI.

Area: 795 square miles.

Population: 34,436 (1910 census).

Location: Southwestern portion of State, bordering Pacific Ocean.

Orange County is one of the many in California which on casual inspection appears to be anything but a mineral producing section. It stands, however, as the third county in the State in regard to the total value of mineral output, its highly productive oil fields making such a condition possible.

This county made a tremendous gain in 1913, with a total value of mineral products of \$6,948,495, over the 1912 output, worth \$4,518,275.

Aside from the substances actually produced and noted in the table below, gypsum, iron, infusorial earth, sandstone, and tourmaline have been found in Orange County.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	2,100 M	\$14,000 00
Clay -----	15,500 tons	20,666 00
Natural gas -----	192,240 M	9,612 00
Petroleum -----	9,485,362 bbls.	6,867,402 00
Stone industry* -----		36,815 00
Total -----		\$6,948,495 00

*See page 42.

Placer.

Area: 1,395 square miles.

Population: 18,237 (1910 census).

Location: Eastern border of State, directly west of Lake Tahoe.

While standing only twenty-fourth on the list of mineral producing counties, Placer contains a wide variety of mineral substances which have never been commercially exploited. Its leading products are gold and granite. Other mineral resources, many of them undeveloped, are: Asbestos, brick, chromite, clay, coal, copper, gems, gold, iron, limestone, magnesite, manganese, marble, quartz crystals, sand-glass, silver, soap-stone, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	1,900 M	\$40,000 00
Clay -----	63,600 tons	47,200 00
Copper -----	429 lbs.	67 00
Gold -----		220,785 00
Lead -----	805 tons	35 00
Quartz -----	2,000 tons	4,000 00
Silver -----		2,972 00
Stone industry* -----		205,749 00
Total -----		\$520,808 00

*See page 42.

Plumas.

Area: 2,594 square miles.

Population: 5,259 (1910 census).

Location: Northeastern border of State, south of Lassen.

A considerable portion of the area of Plumas County lies in the high mountains and deposits of the metals, especially copper, abound here. Lack of transportation and other facilities have retarded its growth and its future is decidedly promising. Mineral production for 1913 was valued at \$143,698, as compared with the 1912 output, worth \$196,997.

Among its mineral resources are chromite, copper, gold, granite, iron, lead, limestone, manganese, platinum minerals, silver, tungsten, and zinc.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Copper -----	17,274 lbs	\$2,678 00
Gold -----		138,368 00
Lead -----	5,621 lbs.	247 00
Silver -----		705 00
Stone industry* -----		1,700 00
Total -----		\$143,698 00

*See page 42.

Riverside.

Area: 7,240 square miles.

Population: 34,696 (1910 census).

Location: Southern portion of State.

Riverside is the fourth county in the State in size and the thirteenth in regard to the total value of mineral output for 1913. Within its borders are included mountain, desert and agricultural land. Its mineral resources include metals, structural and industrial materials, and salines, some of the more important being asbestos, borax, brick, cement, clay, coal, copper, gems, gold, graphite, gypsum, iron, lead, limestone, magnesite, marble, mineral paint, mineral water, nitre, salt, sand-glass, soapstone, silver, stone industry, and tin.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	3,530 M	\$30,300 00
Clay -----	88,936 tons	89,963 00
Copper -----	8,971 lbs.	1,391 00
Gems -----		1,000 00
Gold -----		12,501 00
Gypsum -----	1,000 tons	3,000 00
Magnesite -----	569 tons	4,552 00
Mineral water -----	200,000 gals.	20,000 00
Silver -----		104 00
Stone Industry* -----		536,844 00
Other minerals -----		1,372,314 00
Totals -----		\$2,071,969 00

*See page 42.

Sacramento.

Area: 983 square miles.

Population: 90,000 (estimate of Chamber of Commerce, 1913).

Location: North central portion of State.

Sacramento stands ninth among the counties of the State as a mineral producer, the output, principally gold, for 1913 being valued at \$2,925,706, as compared with the 1912 production, worth \$2,171,399. In regard to gold output alone this county ranks third, being exceeded only by Amador and Nevada counties. Its mineral resources include brick, clay, gold, natural gas, platinum, silver, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	22,535 M	\$144,191 00
Gold -----		2,503,633 00
Natural gas -----	72,000 M	36,000 00
Silver -----		3,406 00
Stone Industry* -----		238,476 00
Total -----		\$2,925,706 00

*See page 42.

San Benito.

Reference: State Mineralogist Report XII.

Area: 1,392 square miles.

Population: 8,041 (1910 census).

Location: West central portion of State.

Although twenty-fifth among the counties of the State in regard to value of total mineral production, San Benito leads in one important branch of the mineral industry, namely, quicksilver production.

Its other mineral resources, many of them undeveloped, include antimony, bituminous rock, chromite, coal, gypsum, gems, limestone, mineral water, soapstone, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Mineral water -----	7,000 gals.	\$4,500 00
Quicksilver -----	9,719 flasks	390,995 00
Stone industry* -----		119,500 00
Total -----		\$514,995 00

*See page 42.

San Bernardino.

Reference: State Mineralogist Reports VIII, IX, XI.

Area: 20,157 square miles.

Population: 75,000 (estimate by board of supervisors, 1913).

Location: Southeastern portion of State.

San Bernardino, by far the largest county in the State, ranks twelfth as regards the value of its mineral output for 1913, with a total of \$2,486,100. This county, consisting largely of mountain and desert country, is highly mineralized, a few of the more important mineral resources being asbestos, barytes, borax, brick, cement, clay, copper, gems, gold, gypsum, iron, lead, limestone, marble, mineral paint, mineral water, nitre, potash, salt, silver, soapstone, soda, stone industry, tungsten, tufa, vanadium, and zinc.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Barytes -----	50 tons	\$550 00
Brick -----	350 M	2,100 00
Copper -----	497,852 lbs.	77,167 00
Gems -----		550 00
Gold -----		356,524 00
Gypsum -----	25,000 tons	74,000 00
Lead -----	279,241 lbs.	12,287 00
Lime -----	121,544 bbls.	113,856 00
Limestone -----	25,896 tons	35,464 00
Mineral water -----	4,500 gals.	3,000 00
Salt -----	3,049 tons	10,573 00
Silver -----		44,413 00
Stone industry* -----		364,312 00
Other minerals -----		1,391,304 00
Total -----		\$2,486,100 00

*See page 42.

San Diego.

Reference: State Mineralogist Reports VI, VIII, XI.

Area: 4,221 square miles.

Population: 140,000 (estimate by Chamber of Commerce, 1913).

Location: Extreme southwest corner of State.

San Diego, first in California in the production of gem stones, ranks twenty-ninth in regard to its total value of mineral output. This figure for 1913 equaled \$315,694, as compared to the 1912 output, worth \$305,683. Aside from minerals commercially produced, as shown below, San Diego County contains deposits of asbestos, bismuth, copper, lithia, mica, marble, potash, soapstone, and tungsten.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	9,384 M	\$68,400 00
Clay -----	838 tons	2,840 00
Gems -----		7,465 00
Mineral water -----	41,500 gals.	15,225 00
Salt -----	20,500 tons	51,750 00
Stone industry* -----		170,014 00
Total -----		\$315,694 00

*See page 42.

San Francisco.

Area: 43 square miles.

Population: 560,582 (estimate by Chamber of Commerce, 1913).

Surprising as it may appear at first glance, San Francisco County is listed among the mineral producing sections of the State, actual production consisting of crushed rock, sand, and gravel. Small quantities of various valuable mineral substances are found here, including cinnabar, gypsum, lignite and magnesite, none, however, in paying quantities.

Commercial production for 1913 was as follows:

Substance	Value
Stone industry* -----	\$110,551 00
Total -----	\$110,551 00

*See page 42.

San Joaquin.

Area: 1,448 square miles.

Population: 50,731 (1910 census).

Location: Central portion of State.

San Joaquin County reported a mineral production for the year 1913 having a total value of \$165,157, as compared with the 1912 output, worth \$210,040. Comparatively few mineral substances are found here, the chief ones being brick, clay, infusorial earth, manganese, natural gas, and sand-glass.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	6,314 M	\$73,768 00
Clay† -----	1,494 tons	18,522 00
Natural gas -----	142,730 M	67,967 00
Sand-glass -----	3,000 tons	4,000 00
Stone industry* -----		900 00
Total -----		\$165,157 00

*See page 42.

†High-grade fire clay.

San Luis Obispo.

Area: 3,334 square miles.

Population: 19,383 (1910 census).

Location: Bordered by Kern County on the east and the Pacific Ocean on the west.

San Luis Obispo County more than doubled its mineral production in 1913, as compared with the previous year. The total value for 1913 amounted to \$63,675, as compared with the 1912 output, worth \$31,564. Among its mineral resources, both developed and undeveloped, are asphalt, bituminous rock, brick, chromite, coal, copper, gold, gypsum, infusorial earth, limestone, marble, mineral water, onyx, petroleum, quicksilver, silver, and stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Bituminous rock -----	609 tons	\$1,149 00
Brick -----	1,500 M	15,000 00
Gold -----		124 00
Mineral water -----	1,500 gals.	600 00
Quicksilver -----	1,160 flasks	46,667 00
Silver -----		1 00
Stone industry* -----		134 00
Total -----		\$63,675 00

*See page 42.

San Mateo.

Area: 447 square miles.

Population: 37,500 (estimate by county board of supervisors, 1913).

Location: Peninsula, joining San Francisco on the north.

San Mateo's most important mineral products are limestone and salt, the latter being derived by evaporation from the waters of San Francisco Bay. The total value of all mineral production during 1913 equaled \$215,371, almost identical with the 1912 figures of \$216,582.

Small amounts of barytes, chromite, infusorial earth and quicksilver have been discovered in addition to the items of economic value noted below.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	1,418 M	\$44,680 00
Clay -----	2,000 tons	1,000 00
Gems -----		300 00
Limestone -----	138,544 tons	78,506 00
Salt -----	28,000 tons	72,250 00
Stone industry* -----		18,635 00
Total -----		\$215,371 00

*See page 42.

Santa Barbara.

Area: 2,740 square miles.

Population: 27,738 (1910 census).

Location: Southwestern portion of State, joining San Luis Obispo on the south.

Five out of the six leading counties of the State, in regard to the value of their mineral production, owe their position to the presence of productive oil fields within their boundaries. Santa Barbara County is sixth on the list, with a total value of \$3,636,288 for the year 1913, as compared with the 1912 output of \$4,111,258.

Aside from the mineral substances listed below Santa Barbara County contains asphalt, gilsonite, gypsum, magnesite, and quicksilver in more or less abundance.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Bituminous rock -----	10,000 tons	\$10,000 00
Brick -----	3,000 M	24,000 00
Infusorial earth -----	6,895 tons	28,960 00
Lime -----	26,512 bbls.	25,910 00
Limestone -----	5,884 tons	19,623 00
Mineral water -----	112,500 gals.	108,135 00
Natural gas -----	5,096,300 M	254,815 00
Petroleum -----	6,291,076 bbls.	3,151,725 00
Sandstone -----	4,500 cu. ft.	1,670 00
Stone industry* -----		11,450 00
Total -----		\$3,636,288 00

*See page 42.

Santa Clara.

Reference: State Mineralogist Report IX.

Area: 1,328 square miles.

Population: 97,039 (estimate by Chamber of Commerce, 1913).

Location: West central portion of State.

Owing to a decided decrease in its leading mineral product, quicksilver, Santa Clara County reported a mineral output for 1913 of \$311,383, as compared with the 1912 figure of \$557,585. This county, lying largely in the Coast Range of mountains, contains a wide variety of mineral substances, including clay, limestone, magnesite, manganese, mineral water, petroleum, quicksilver, soapstone, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	18,000 M	\$95,000 00
Lime -----	13,107 bbls.	9,783 00
Limestone -----	3,549 tons	4,200 00
Magnesite -----	70 tons	560 00
Mineral water -----	101,000 gals.	10,750 00
Natural gas -----	2,000 M	500 00
Petroleum -----	20,000 bbls.	12,000 00
Quicksilver -----	3,709 flasks	149,213 00
Stone industry* -----		29,377 00
Total -----		\$311,383 00

*See page 42.

Santa Cruz.

Area: 435 square miles.

Population: 26,140 (1910 census).

Location: Bordering Pacific Ocean, just south of San Mateo County.

The mineral output of Santa Cruz County, a portion of which is itemized below, amounted to a total value of \$1,816,805, giving the county a standing of eighteenth among all others in the State in this regard.

Among the mineral resources known here are bituminous rock, cement, coal, graphite, gold, lime, limestone, petroleum, silver, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Bituminous rock -----	26,932 tons	\$67,330 00
Lime -----	75,000 bbls.	60,000 00
Limestone -----	39,494 tons	30,994 00
Stone industry* -----		10,511 00
Other minerals -----		1,647,970 00
Total -----		\$1,816,805 00

*See page 42.

Shasta.

Reference: State Mineralogist Report XI.

Area: 3,858 square miles.

Population: 18,920 (1910 census).

Location: North central portion of State.

Shasta County stands fourth in California among the mineral producing counties with an output valued at \$6,212,344 for 1913, as compared with the 1912 production, worth \$5,825,819. Not taking petroleum into account, Shasta leads all the counties by a wide margin.

This county is first in copper production, first in silver, first in pyrite, third in lead, sixth in gold. The Shasta copper belt is the most important deposit of this metal on the Pacific coast, and the present production would be practically doubled were it not for the conflict between the agricultural interests and the smelters regarding the alleged damage done to crops by the smelter fumes. Some of the smelters have been closed by injunction and others have been forced to curtail their output in the effort to render their gaseous waste innocuous.

Shasta's leading mineral resources are asbestos, barytes, brick, chrome, copper, iron, gold, lead, lime, limestone, mineral water, pyrite, silver, stone industry, and zinc.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Asbestos -----	47 tons	\$1,175 00
Brick -----	360 M	4,330 00
Chromite -----	280 tons	2,800 00
Copper -----	27,688,436 lbs.	4,291,708 00
Gold -----	-----	1,208,870 00
Lead -----	19,070 lbs.	839 00
Lime -----	8,595 bbls.	7,030 00
Limestone -----	41,346 tons	35,616 00
Mineral water -----	30,000 gals.	6,850 00
Pyrite -----	72,971 tons	194,409 00
Silver -----	-----	448,031 00
Other minerals -----	-----	10,686 00
Total -----	-----	\$6,212,344 00

Sierra.

Reference: State Mineralogist Report VI.

Area: 923 square miles.

Population: 4,098 (1910 census).

Location: Eastern border of State, just north of Nevada County.

Sierra County made a notable increase in her mineral production during 1913 with a value of \$1,010,976, as compared with the 1912 output worth \$736,423. Of the twenty-one counties in the State during 1913 which reported a mineral production in excess of \$1,000,000 Sierra ranks last. Considering gold output alone this county stands eighth.

Aside from the metals itemized below Sierra County contains deposits of asbestos, chromite, iron, platinum minerals, serpentine and talc.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Gold -----	2,228 lbs.	\$1,006,573 00
Lead -----		98 00
Silver -----		4,305 00
Total -----		\$1,010,976 00

Siskiyou.

Area: 6,256 square miles.

Population: 18,800 (1910 census).

Location: Extreme north central portion of State, next Oregon boundary.

Siskiyou, fifth county in California in regard to size, located in a highly mineralized and mountainous country, ranks thirty-first in regard to the value of its mineral output for 1913. Although the county is traversed by a railroad in a north and south line, the mineral bearing sections are almost without exception far from transportation and other facilities. A large part of the county is accessible by trail alone. Future development and exploitation will doubtless increase the productiveness of this part of the State to a great degree.

Among Siskiyou's mineral resources are, chromite, clay, coal, copper, gems, gold, limestone, marble, mineral water, pumice stone, quicksilver, sandstone, silver, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Gems -----		\$250 00
Gold† -----		180,125 00
Mineral water -----	700,000 gals.	120,000 00
Pumice stone -----	90 tons	2,000 00
Silver† -----		1,228 00
Stone industry* -----		4,883 00
Other minerals -----		1,500 00
Total -----		\$309,986 00

*See page 42.

†Production from dredging operations included in the Stanislaus total.

Solano.

Area: 822 square miles.

Population: 27,559 (1910 census).

Location: Touching San Francisco Bay on the northeast.

Solano while mostly valley land, produced mineral substances during the year 1913 to the total value of \$1,839,721, ranking seventeenth among

the counties of the State. Among her mineral resources are bituminous rock, brick, cement, clay, fuller's earth, limestone, mineral water, natural gas, onyx, petroleum, quicksilver, salt, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Mineral water -----	23,600 gals.	\$3,440 00
Natural gas -----	6,319 M	7,366 00
Stone industry* -----		28,915 00
Other minerals -----		1,800,000 00
Total -----		\$1,839,721 00

*See page 42.

Sonoma.

Area: 1,577 square miles.

Population: 48,394 (1910 census).

Location: South of Mendocino County, bordering on Pacific Ocean.

Sonoma ranked thirty-fifth among the counties of California during the year 1913 with a mineral production valued at \$239,037, as compared with its 1912 output worth \$346,306. More paving blocks are manufactured here than in any other section of the State.

Among Sonoma's mineral resources are brick, chromite, clay, copper, graphite, magnesite, marble, mineral paint, mineral water, quicksilver, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Infusorial earth -----	50 tons	\$208 00
Mineral water -----	96,240 gals.	46,910 00
Quicksilver -----	12 flasks	483 00
Stone industry* -----		191,436 00
Total -----		\$239,037 00

*See page 42.

Stanislaus.

Area: 1,450 square miles.

Population: 35,000 (estimate by the county board of supervisors. 1913).

Location: Center of State, bounded on south by Merced County.

Gold is the chief mineral product of Stanislaus County, although deposits of clay, gypsum, iron, manganese, mineral paint, quicksilver and silver are found here to some extent as well. This county ranks thirty-third in the State in regard to value of mineral output.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	300 M	\$2,400 00
Gold -----		253,166 00
Mineral paint -----	255 tons	1,530 00
Silver -----		671 00
Stone industry* -----		14,482 00
Total -----		\$272,249 00

*See page 42.

Sutter.

Area: 608 square miles.

Population: 6,328 (1910 census).

Location: Bounded by Butte County on the north and Sacramento on the south.

Sutter shares with Yolo County the distinction of being the only section of the State which had no commercial output of some kind of mineral substance during 1913. Both clay and coal exist here, but deposits of neither mineral have been placed on a productive basis.

Tehama.

Reference: State Mineralogist Report XI.

Area: 2,893 square miles.

Population: 11,401 (1910 census).

Location: North central portion of the State, bounded on the north by Shasta.

Tehama stands fifty-third among the fifty-six mineral producing counties of the State. Its mineral output during 1913 was valued at \$2,442 as compared with the 1912 production worth \$1,300. Mt. Lassen is located within the boundaries of this county.

Among its mineral resources are listed, brick, chromite, copper, gold, marble, mineral water, salt, silver, and the stone industry.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	300 M	\$1,800 00
Mineral water -----	75 gals.	42 00
Stone industry* -----		600 00
Total -----		\$2,442 00

*See page 42.

Trinity.

Reference: State Mineralogist Report X.

Area: 3,166 square miles.

Population: 3,301 (1910 census).

Location: Northwestern portion of State.

Trinity, like Siskiyou County, requires transportation facilities to further the development of its many and varied mineral resources. Deposits of asbestos, barytes, chromite, copper, gold, platinum, quicksilver, and building stone are known here, but with the exception of gold, very little active production of these mineral substances is possible.

Commercial output for 1913 was as follows:

Substance	Amount	Value
Gold -----		\$431,862 00
Quicksilver -----	4 flasks	161 00
Silver -----		2,119 00
Stone industry* -----		1,000 00
Total -----		\$435,142 00

*See page 42.

Tulare.

Reference: State Mineralogist Report VIII.

Area: 4,856 square miles.

Population: 35,440 (1910 census).

Location: Bounded by Inyo on the east, Kern on the south, Fresno on the north.

Tulare stands forty-second on the list of mineral producing counties. Her mineral resources, among others, are brick, clay, copper, feldspar, graphite, gems, infusorial earth, magnesite, marble, natural gas, glass sand, soapstone, stone industry, zinc.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	6,000 M	\$45,000 00
Feldspar -----	1,429 tons	5,050 00
Gems -----		1,500 00
Magnesite -----	7,858 tons	62,864 00
Marble -----	392 cu.ft.	796 00
Quartz -----	80 tons	200 00
Stone industry* -----		4,350 00
Total -----		\$119,760 00

*See page 42.

Tuolumne.

Reference: State Mineralogist Report VI.

Area: 2,190 square miles.

Population: 9,979 (1910 census).

Location: East central portion of State—Mother Lode district.

Tuolumne ranks nineteenth among the counties of the State relative to its total value of mineral output. As a producer of marble its standing is first.

Chromite, clay, copper, gold, limestone, marble, mineral paint, platinum, soapstone, silver, and the stone industry are the leading mineral resources.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Copper -----	893 lbs.	\$138 00
Gold -----		974,409 00
Lead -----	1,206 lbs.	53 00
Lime -----	75,000 bbls.	85,000 00
Limestone -----	12,446 tons	20,676 00
Marble -----	37,312 cu.ft.	93,726 00
Silver -----		24,381 00
Total -----		\$1,198,383 00

Ventura.

Reference: State Mineralogist Report VIII.

Area: 1,878 square miles.

Population: 18,347 (1910 census).

Location: Southwestern portion of State, bordering on Pacific Ocean.

Ventura is the twenty-second county in the State in respect to the value of its mineral production for 1913, the exact figure being \$924,972, as compared with the output for 1912 worth \$595,399.

The best grade of petroleum produced in the State is found here.

Among its other mineral resources are asphalt, borax, brick, clay, mineral water, natural gas, sandstone.

Commercial production for 1913 was as follows:

Substance	Amount	Value
Brick -----	1,023 M	\$6,085 00
Clay -----	3,000 tons	2,990 00
Natural gas -----	62,200 M	6,220 00
Petroleum -----	899,007 bbls.	907,997 00
Sandstone -----	300 cu.ft.	150 00
Other minerals -----		1,530 00
Total -----		\$924,972 00

Yolo.

Area: 1,014 square miles.

Population: 13,926 (1910 census).

Location: Sacramento Valley, bounded by Sutter on the east and Colusa on the north.

No commercial production of mineral substances. One of the two counties in California which did not report a mineral production during 1913.

Deposits, of undetermined value, of iron, quicksilver and sandstone have been discovered within the confines of this county.

Yuba.

Area: 639 square miles.

Population: 10,042 (1910 census).

Location: Lies west of Sierra and Nevada counties; south of Plumas.

Yuba is eleventh of the fifty-six mineral producing counties of California and is fourth in regard to gold output. Quicksilver and iron deposits have been located in this county aside from the following commercial production as reported for the year 1913:

Substance	Value
Gold -----	\$2,491,505 00
Silver -----	7,571 00
Stone industry* -----	8,063 00
Total -----	\$2,507,139 00

*See page 42.

CHAPTER VIII.

MINING LAWS.

The fundamental Federal and State statutes governing mining, the California mine bell signals and forms of location notices are given herewith.

FEDERAL STATUTES.

Title XXXII, Chapter 6, Revised Statutes.

SEC. 2319. All valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and purchase, and the lands in which they are found to occupation and purchase, by citizens of the United States and those who have declared their intention to become such, under regulations prescribed by law, and according to the local customs or rules of miners in the several mining districts, so far as the same are applicable and not inconsistent with the laws of the United States.

SEC. 2320. Mining claims upon veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, heretofore located, shall be governed as to length along the vein or lode by the customs, regulations, and laws in force at the date of their location. A mining claim located after the tenth day of May, eighteen hundred and seventy-two, whether located by one or more persons, may equal, but shall not exceed, one thousand five hundred feet in length along the vein or lode; but no location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located. No claim shall extend more than three hundred feet on each side of the middle of the vein at the surface, nor shall any claim be limited by any mining regulation to less than twenty-five feet on each side of the middle of the vein at the surface, except where adverse rights existing on the tenth day of May, eighteen hundred and seventy-two, render such limitation necessary. The end lines of each claim shall be parallel to each other.

SEC. 2321. Proof of citizenship, under this chapter, may consist in the case of an individual, of his own affidavit thereof; in the case of an association of persons unincorporated, of the affidavit of their authorized agent, made on his own knowledge, or upon information and belief; and in the case of a corporation organized under the laws of the United States, or of any state or territory thereof, by the filing of a certified copy of their charter or certificate of incorporation.

This is supplemented by an act of April 26, 1882, which provides:

"That applicants for mineral patents, if residing beyond the limits of the district wherein the claim is situated, may make any oath or affidavit required for proof of citizenship before the clerk of any court of record, or before any notary public of any state or territory." (22 Stats. at Large, p. 49, chap. 106.)

SEC. 2322. The locators of all mining locations heretofore made or which shall hereafter be made, on any mineral vein, lode, or ledge, situated on the public domain, their heirs and assigns, where no adverse claims exist on the tenth day of May, eighteen hundred and seventy-two, so long as they comply with the laws of the United States, and with state, territorial and local regulations not in conflict with the laws of the United States governing their possessory title, shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations, and of all veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically, although such veins, lodes, or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side lines of such surface locations. But their right of possession to such outside parts of such veins or ledges shall be confined

to such portions thereof as lie between vertical planes drawn downward as above described through the end lines of their locations, so continued in their own direction that such planes will intersect such exterior parts of such veins or ledges. And nothing in this section shall authorize the locator or possessor of a vein, or lode which extends in its downward course beyond the vertical lines of his claim, to enter upon the surface of a claim owned or possessed by another.

SEC. 2323. Where a tunnel is run for the development of a vein or lode, or for the discovery of mines, the owners of such tunnel shall have the right of possession of all veins or lodes within three thousand feet from the face of such tunnel on the line thereof, not previously known to exist, discovered in such tunnel, to the same extent as if discovered from the surface and locations on the line of such tunnel of veins or lodes not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid, but failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins on the line of such tunnel.

SEC. 2324. The miners of each mining district may make regulations not in conflict with the laws of the United States, or with the laws of the state or territory in which the district is situated, governing the location, manner of recording, amount of work necessary to hold possession of a mining claim, subject to the following requirements: The location must be distinctly marked on the ground so that its boundaries can be readily traced. All records of mining claims hereafter made shall contain the name or names of the locators, the date of the location, and such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim. On each claim located after the tenth day of May, eighteen hundred and seventy-two, and until a patent has been issued therefor, not less than one hundred dollars' worth of labor shall be performed or improvements made during each year.

Be it enacted by the senate and house of representatives of the United States of America in congress assembled, that section two thousand, three hundred and twenty-four of the Revised Statutes be, and the same is hereby, amended so that where a person or company has or may run a tunnel for the purpose of developing a lode or lodes, owned by said person or company, the money so expended in said tunnel shall be taken and considered as expended on said lode or lodes, whether located prior to or since the passage of said act; and such person or company shall not be required to perform work on the surface of said lode or lodes in order to hold the same as required by said act. (18 Stats. at Large, page 315, chap. 41.)

An amendment of January 22, 1880, reads:

"Provided, that the period within which the work required to be done annually on all unpatented mineral claims shall commence on the first day of January succeeding the date of location of such claim, and this section shall apply to all claims located since the tenth day of May, Anno Domini eighteen hundred and seventy-two." (21 Stats. at Large, page 61, chap. 9.)

The federal law fixes the minimum of labor requirements. State and local laws may require additional work as part of the act of location. This has been sustained by Supreme Court decisions.

Section 2325 of the federal statutes provides that after \$500 has been expended on a mining claim in work or improvements, a patent can be applied for upon the claim in work or improvements, a patent can be applied for upon the claim being surveyed by a United States mineral surveyor, and by the payment of \$5 per acre for the land to the United States government.

SEC. 2329. Claims usually called "placers" including all forms of deposit, excepting veins of quartz, or other rock in place, shall be subject to entry and patent, under like circumstances and conditions, and upon similar proceedings, as are provided for vein or lode claims; but where the lands have been previously surveyed by the United States, the entry in its exterior limits shall conform to the legal subdivisions of public lands.

The following can be located as placer: Stone, oil, salt springs, granite quarries, marble.

(Act of August 4, 1892, ch. 375, 27 Stat. L. 348.)

Entry of building stone lands under placer laws.

SECTION 1. Any person authorized to enter lands under the mining laws of the United States may enter lands that are chiefly valuable for building stone under the provisions of the law in relation to placer mineral claims; *provided*, that lands reserved for the benefit of the public schools or donated to any state shall not be subject to entry under this act. (27 Stat. L. 348.)

(Act of January 31, 1901, ch. 186, 31 Stat. L. 745.)

Entry of saline lands under placer laws.

All unoccupied public lands of the United States containing salt springs, or deposits of salt in any form, and chiefly valuable therefor, are hereby declared to be subject to location and purchase under the provisions of the law relating to placer mining claims; *provided*, that the same person shall not locate or enter more than one claim hereunder. (31 Stat. L. 745.)

SEC. 2330. Legal subdivisions of forty acres may be subdivided into ten-acre tracts, and two or more persons, or associations of persons, having contiguous claims of any size, although such claims may be less than ten acres each, may make joint entry thereof; but no location of a placer claim, made after the ninth day of July, eighteen hundred and seventy, shall exceed one hundred and sixty acres for any one person or association of persons, which location shall conform to the United States surveys; and nothing in this section contained shall defeat or impair any bona fide preemption or homestead claim upon agricultural lands, or authorize the sale of the improvements of any bona fide settler to any purchaser.

SEC. 2331. Where placer claims are upon surveyed lands, and conform to legal subdivisions, no further survey or plat shall be required, and all placer mining claims located after the tenth day of May, eighteen hundred and seventy-two, shall conform as near as practicable with the United States system of public lands surveys, and the rectangular subdivisions of such surveys, and no such location shall include more than twenty acres for each individual claimant; but where placer claims can not be conformed to legal subdivisions, survey and plat shall be made as on unsurveyed lands; and where by the segregation of mineral land in any legal subdivision a quantity of agricultural land less than forty acres remains, such fractional portion of agricultural land may be entered by any party qualified by law, for homestead or preemption purposes.

Placer boundaries.

SEC. 2333. Where the same person, association, or corporation is in possession of a placer claim, and also a vein or lode included within the boundaries thereof, application shall be made for a patent for the placer claim, with the statement that it includes such vein or lode, and in such case a patent shall issue for the placer claim, subject to the provisions of this chapter, including such vein or lode upon the payment of five dollars per acre for such vein or lode claim, and twenty-five feet of surface on each side thereof. The remainder of the placer claim, or any placer claim not embracing any vein or lode claim, shall be paid for at the rate of two dollars and fifty cents per acre, together with all costs of proceedings; and where a vein or lode, such as is described in section twenty-three hundred and twenty, is known to exist within the boundaries of a placer claim, an application for a patent for such placer claim which does not include an application for the vein or lode claim shall be construed as a conclusive declaration that the claimant of the placer claim has no right of possession of the vein or lode claim; but where the existence of a vein or lode in a placer claim is not known, a patent for the placer claim shall convey all valuable mineral and other deposits within the boundaries thereof.

OIL AND GAS CLAIMS.

These are located as placer claims. See sections 2329 to 2333, U. S. statutes.

An act authorizing entry of petroleum or other mineral oil lands under placer claim laws.

Any person authorized to enter lands under the mining laws of the United States may enter and obtain patents to lands containing petroleum or other mineral oils, and chiefly valuable therefor, under the provisions of the laws relating to placer mineral claims; *provided*, that lands containing such petroleum or other mineral oils which have heretofore been filed upon, claimed, or improved as mineral, but not yet patented, may be held and patented under the provisions of this act the same as if such filing, claim or improvement were subsequent to the date of the passage hereof. (29 Stat. L. 526.) Approved Feb. 11, 1897.

An act defining what shall constitute assessments on oil mining claims.

(Act of February 12, 1903, ch. 548, 32 Stat. L. 825.)

Where oil lands are located under the provisions of title thirty-two, chapter six, Revised Statutes of the United States, as placer mining claims, the annual assessment labor upon such claims may be done upon any one of a group of claims lying contiguous and owned by the same person or corporation, not exceeding five claims in all; *provided*, that said labor will tend to the development or to determine the oil-bearing character of such contiguous claims.

THE "PICKETT BILL."

An act to authorize the President of the United States to make withdrawals of public lands in certain cases.

This provides also:

SEC. 2. All lands withdrawn under the provisions of this act shall at all times be open to exploration, discovery, occupation, and purchase, under the mining laws of the United States, so far as the same apply to minerals other than coal, oil, gas, and phosphates.

MINING CLAIMS IN FOREST RESERVES.

The congressional act of June 4, 1897, provides:

"It is not the purpose or intent of these provisions, or of the act providing for such reservations, to authorize the inclusion therein of lands more valuable for the mineral therein, or for agricultural purposes, than for forest purposes."

* * *

"Nor shall anything herein prohibit any person from entering upon such forest reservations for all proper and lawful purposes, including that of prospecting, locating and developing the mineral resources thereof; *provided*, that such persons comply with the rules and regulations covering such forest reservations."

* * *

"And any mineral lands in any forest reservation which have been or may be shown to be such and subject to entry under the existing mining laws of the United States and the rules and regulations applying thereto, shall continue to be subject to such location and entry notwithstanding any provisions herein contained."

Under these statutes it is now held by the land department that the forest reserves are open to the location of mining claims. There can be no doubt of the meaning of congress upon this subject: That lands within the forest reserves are subject to the operation of the mining laws.

CALIFORNIA DEBRIS COMMISSION.

An act to create the California Débris Commission and regulate hydraulic mining in the State of California.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a commission is hereby created, to be known as the California Débris Commission, consisting of three members. The president of

the United States shall by and with the advice and consent of the Senate, appoint the commission from officers of the corps of engineers, United States army. Vacancies occurring therein shall be filled in like manner. It shall have the authority, and exercise the powers hereinafter set forth, under the supervision of the chief of engineers and direction of the secretary of war.

SEC. 2. That said commission shall organize within thirty days after its appointment by the selection of such officers as may be required in the performance of its duties, the same to be selected from the members thereof. The members of said commission shall receive no greater compensation than is now allowed by law to each, respectively, as an officer of said corps of engineers. It shall also adopt rules and regulations, not inconsistent with law, to govern its deliberations and prescribe the method of procedure under the provisions of this act.

SEC. 3. That the jurisdiction of said commission, in so far as the same affects mining carried on by the hydraulic process shall extend to all such mining in the territory drained by the Sacramento and San Joaquin river systems in the State of California. Hydraulic mining, as defined in section eight hereof, directly or indirectly injuring the navigability of said river systems, carried on in said territory other than as permitted under the provisions of this act is hereby prohibited and declared unlawful.

SEC. 4. That it shall be the duty of said commission to mature and adopt such plan or plans, from examinations and surveys already made and from such additional examinations and surveys as it may deem necessary, as will improve the navigability of all the rivers comprising said systems, deepen their channels, and protect their banks. Such plan or plans shall be matured with a view of making the same effective as against the encroachment of and damage from débris resulting from mining operations, natural erosion, or other causes, with a view of restoring, as near as practicable and the necessities of commerce and navigation demand, the navigability of said rivers to the condition existing in eighteen hundred and sixty, and permitting mining by the hydraulic process, as the term is understood in said state, to be carried on, provided the same can be accomplished without injury to the navigability of said rivers or the lands adjacent thereto.

SEC. 5. That it shall further examine, survey, and determine the utility and practicability, for the purposes hereinafter indicated, of storage sites in the tributaries of said rivers and in the respective branches of said tributaries, or in the plains, basins, sloughs, and tule and swamp lands adjacent to or along the course of said rivers, for the storage of débris or water or as settling reservoirs, with the object of using the same by either or all of these methods to aid in the improvement and protection of said navigable rivers by preventing deposits therein of débris resulting from mining operations, natural erosion, or other causes, or for affording relief thereto in flood time and providing sufficient water to maintain scouring force therein in the summer season; and in connection therewith to investigate such hydraulic and other mines as are now or may have been worked by methods intended to restrain the débris and material moved in operating such mines by impounding dams, settling reservoirs, or otherwise, and in general to make such study of and researches in the hydraulic mining industry as science, experience and engineering skill may suggest as practicable and useful in devising a method or methods whereby such mining may be carried on as aforesaid.

SEC. 6. That the said commission shall from time to time note the conditions of the navigable channels of said river systems, by cross-section surveys or otherwise, in order to ascertain the effect therein of such hydraulic mining operations as may be permitted by its orders and such as is caused by erosion, natural or otherwise.

SEC. 7. That said commission shall submit to the chief of engineers for the information of the secretary of war, on or before the fifteenth day of November of each year a report of its labors and transactions, with plans for the construction, completion, and preservation of the public works outlined in this act, together with estimates of the cost thereof, stating what amounts can be profitably expended thereon each year. The secretary of war shall thereupon submit same to congress on or before the meeting thereof.

SEC. 8. That for the purpose of this act "hydraulic mining" and "mining by the hydraulic process," are hereby declared to have the meaning and application given to said terms in said state.

SEC. 9. That the individual proprietor or proprietors, or in case of a corporation its manager or agent appointed for that purpose, owning mining ground in the territory in the State of California mentioned in section three hereof, which it is desired to work by the hydraulic process, must file with said commission a verified petition, setting forth such facts as will comply with law and the rules prescribed by said commission.

SEC. 10. That said petition shall be accompanied by an instrument duly executed and acknowledged, as required by the law of the said state, whereby the owner or owners of such mine or mines surrender to the United States the right and privilege to regulate by law, as provided in this act, or any law that may hereafter be enacted, or by such rules and regulations as may be prescribed by virtue thereof the manner and method in which the débris resulting from the working of said mine or mines shall be restrained, and what amount shall be produced therefrom; it being understood that the surrender aforesaid shall not be construed as in any way affecting the right of such owner or owners to operate said mine or mines by any other process or method now in use in said state; *provided*, that they shall not interfere with the navigability of the aforesaid rivers.

SEC. 11. That the owners of several mining claims situated so as to require a common dumping ground or dam or other restraining works for the débris issuing therefrom in one or more sites may file a joint petition setting forth such facts in addition to the requirements of section nine hereof; and where the owner of a hydraulic mine or owners of several such mines have and use common dumping sites for impounding débris or as settling reservoirs which sites are located below the mine of an applicant not entitled to use same, such fact shall also be stated in said petition. Thereupon the same proceedings shall be had as provided for herein.

SEC. 12. A notice specifying briefly the contents of said petition and fixing a time previous to which all proofs are to be submitted shall be published by said commission in some newspaper or newspapers of general circulation in the communities interested in the matter set forth therein. If published in a daily paper such publication shall continue for at least ten days; if in a weekly paper in at least three issues of the same. Pending publication thereof said commission, or a committee thereof, shall examine the mine and premises described in such petition. On or before the time so fixed all parties interested, either as petitioners or contestants, whether miners or agriculturists, may file affidavits, plans, and maps in support of their respective claims. Further hearings, upon notice to all parties of record, may be granted by the commission when necessary.

SEC. 13. That in case a majority of the members of said commission, within thirty days after the time so fixed, concur in a decision in favor of the petitioner or petitioners, the said commission shall thereupon make an order directing the methods and specifying in detail the manner in which operations shall proceed in such mine or mines; what restraining or impounding works, if facilities therefor can be found, shall be built, and maintained; how and of what material; where to be located; and in general set forth such further requirements and safeguards as will protect the public interests and prevent injury to the said navigable rivers, and the lands adjacent thereto, with such further conditions and limitations as will observe all the provisions of this act in relation to the working thereof and the payment of taxes on the gross proceeds of the same; *provided*, that all expense incurred in complying with said order shall be borne by the owner or owners of such mine or mines.

SEC. 14. That such petitioner or petitioners must within a reasonable time present plans and specifications of all works required to be built in pursuance of said order for examination, correction, and approval by said commission; and thereupon work may immediately commence thereon under the supervision of said commission or representative thereof attached thereto from said corps of engineers, who shall inspect same from time to time. Upon completion thereof, if found in every respect to meet the requirements of the said order and said approved plans and specifications,

permission shall thereupon be granted to the owner or owners of such mine or mines to commence mining operations, subject to the conditions of said order and the provisions of this act.

SEC. 15. That no permission granted to a mine owner or owners under this act shall take effect, so far as regards the working of a mine, until all impounding dams or other restraining works, if any are prescribed by the order granting such permission, have been completed and until the impounding dams or other restraining works or settling reservoirs provided by said commission have reached such a stage as in the opinion of said commission, it is safe to use the same: *provided, however*, that if said commission shall be of the opinion that the restraining and other works already constructed at the mine or mines shall be sufficient to protect the navigable rivers of said systems and the work of said commission, then the owner or owners of such mine or mines may be permitted to commence operations.

SEC. 16. That in case the joint petition referred to in section eleven hereof is granted, the commission shall fix the respective amounts to be paid by each owner of such mines toward providing and building necessary impounding dams or other restraining works. In the event of a petition being filed after the entry of such order, or in case the impounding dam or dams or other restraining works have already been constructed and accepted by said commission, the commission shall fix such amount as may be reasonable for the privilege of dumping therein, which amount shall be divided between the original owners of such impounding dams or other restraining works in proportion to the amount respectively paid by each party owning same. The expense of maintaining and protecting such joint dam or works shall be divided among mine owners using the same in such proportion as the commission shall determine. In all cases where it is practicable, restraining and impounding works are to be provided, constructed and maintained by mine owners near or below the mine or mines before reaching the main tributaries of said navigable waters.

SEC. 17. That at no time shall any more débris be permitted to be washed away from any hydraulic mine or mines situated on the tributaries of said rivers and the respective branches of each, worked under the provisions of this act, than can be impounded within the restraining works erected.

SEC. 18. That the said commission may at any time when the condition of the navigable rivers or when the capacities of all impounding and settling facilities erected by mine owners or such as may be provided by government authority require same, modify the order granting the privilege to mine by the hydraulic mining process so as to reduce amount thereof to meet the capacities of the facilities then in use, or, if actually required in order to protect the navigable rivers from damage, may revoke same until the further notice of the commission.

SEC. 19. That an intentional violation on the part of a mine owner or owners, company, or corporation, or the agents or the employees of either, of the conditions of the order granted pursuant to section thirteen, or such modifications thereof as may have been made by said commission, shall work a forfeiture of the privileges thereby conferred, and upon notice being served by the order of said commission upon such owner or owners, company or corporation, or agent in charge, work shall immediately cease. Said commission shall take necessary steps to enforce its orders in case of the failure, neglect, or refusal of such owner or owners, company or corporation, or agents thereof, to comply therewith, or in the event of any person or persons, company or corporation working by said process in said territory contrary to law.

SEC. 20. That said commission, or a committee therefrom or office of said corps assigned to duty under its orders, shall, whenever deemed necessary, visit said territory and all mines operating under the provisions of this act. A report of such examination shall be placed on file.

SEC. 21. That the said commission is hereby granted the right to use any of the public lands of the United States, or any rock, stone, timber, trees, brush, or material thereon or therein, for any of the purposes of this act; and the secretary of the interior is hereby authorized and requested, after notice has been filed with the commissioner of the general land office by said commission, setting forth what public

lands are required by it under the authority of this section, that such land or lands shall be withdrawn from sale and entry under the laws of the United States.

SEC. 22. That any person or persons who wilfully or maliciously injure, damage, or destroy, or attempt to injure, damage or destroy, any dam or other work erected under the provisions of this act for restraining, impounding, or settling purposes, or for use in connection therewith, shall be guilty of a misdemeanor, and upon conviction thereof shall be fined not to exceed the sum of five thousand dollars or be imprisoned not to exceed five years, or by both such fine and imprisonment, in the discretion of the court. And any person or persons, company or corporation, their agents or employees, who shall mine by the hydraulic process directly or indirectly injuring the navigable waters of the United States, in violation of the provisions of this act, shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding five thousand dollars, or by imprisonment not exceeding one year, or by both such fine and imprisonment, in the discretion of the court; *provided*, that this section shall take effect on the first day of May, eighteen hundred and ninety-three.

SEC. 23. That upon the construction by the said commission of dams or other works for the detention of débris from hydraulic mines and the issuing of the order provided for by this act to any individual, company, or corporation to work any mine or mines by hydraulic process, the individual, company, or corporation operating thereunder working any mine or mines by hydraulic process, the débris from which flows into or is in whole or in part restrained by such dams or other works erected by said commission, shall pay a tax of three per centum on the gross proceeds of his, their, or its mine so worked; which tax of three per centum shall be ascertained and paid in accordance with regulations to be adopted by the secretary of the treasury, and the treasurer of the United States is hereby authorized to receive the same. All sums of money paid into the treasury under this section shall be set apart and credited to a fund to be known as the "Débris Fund," and shall be expended by said commission under the supervision of the chief of engineers and direction of the secretary of war, in addition to the appropriations made by law in the construction and maintenance of such restraining works and settling reservoirs as may be proper and necessary; *provided*, that said commission is hereby authorized to receive and pay into the treasury from the owner or owners of mines worked by the hydraulic process, to whom permission may have been granted so to work under the provisions thereof, such money advances as may be offered to aid in the construction of such impounding dams or other restraining works, or settling reservoirs, or sites therefor, as may be deemed necessary by said commission to protect the navigable channels of said river systems, on condition that all moneys so advanced shall be refunded as the said tax is paid into the said débris fund; *and provided, further*, that in no event shall the government of the United States be held liable to refund same except as directed by this section.

SEC. 24. That for the purpose of securing harmony of action and economy of expenditures in the work to be done by the United States and the State of California, respectively, the former in its plans for the improvement and protection of the navigable streams and to prevent the depositing of mining débris or other materials within the same, and the latter in its plans authorized by law for the reclamation, drainage, and protection of its lands, or relating to the working of hydraulic mines, the said commission is empowered to consult thereon with a commission of engineers of said state, if authorized by said state for said purpose, the result of such conference to be reported to the chief of engineers of the United States army, and if by him approved shall be followed by said commission.

SEC. 25. That said commission, in order that such material as is now or may hereafter be lodged in the tributaries of the Sacramento and San Joaquin river systems resulting from mining operations, natural erosion, or other causes, shall be prevented from injuring the said navigable rivers or such of the tributaries of either as may be navigable and the land adjacent thereto, is hereby directed and empowered, when appropriations are made therefor by law, or sufficient money is deposited for

that purpose in said débris fund, to build at such points above the head of navigation in said rivers and on the main tributaries thereof, or branches of such tributaries, or at any place adjacent to the same, which in the judgment of said commission will effect said object (the same to be of such material as will insure safety and permanency), such restraining or impounding dams and settling reservoirs, with such canals, locks, or other works adapted and required to complete same. The recommendations contained in executive document numbered two hundred and sixty-seven, fifty-first congress, second session, and executive document numbered ninety-eight, forty-seventh congress, first session, as far as they refer to impounding dams, or other restraining works are hereby adopted, and the same are directed to be made the basis of operations. The sum of fifteen thousand dollars is hereby appropriated, from moneys in the treasury not otherwise appropriated, to be immediately available to defray the expenses of said commission.

Approved March 1, 1893.

INSTRUCTIONS TO OWNERS AND OPERATORS OF HYDRAULIC MINES IN CALIFORNIA.

January 1, 1906.

1. The California Débris Commission is composed of three officers of the corps of engineers, United States army, who are appointed by the president of the United States, with the advice and consent of the Senate, under the authority of the act of congress, approved March 1, 1893. The commission is charged by this act with the enforcement of its provisions, including such regulation and control of hydraulic mining in the drainage areas of the Sacramento and San Joaquin rivers of the State of California as is necessary to cause the tailings from such mining to be so impounded in the vicinity of the mine as to prevent injury to the navigable rivers and adjacent lands. The owners and operators of such mines are required by this law to comply strictly with such requirements of the commission as may be deemed necessary to effect this purpose. An extreme penalty of \$5,000 fine and one year's imprisonment is provided for violation of the act.

2. Hydraulic mining embraces all mining operations where water is used under pressure through a nozzle against any bank of earth, gravel, or other similar material, thus eroding the bank. It is forbidden by law except under the supervision of the commission.

3. The law requires that in all cases a license or written permission must be obtained from the commission before hydraulic mining in the regions mentioned can be legally carried on.

4. Licenses or permission to mine by the hydraulic process are revocable by the commission, and will not be given unless the requirements of the commission are complied with as to sufficiency of suitable restraining barriers or dams. Licenses, when granted, will be suspended or revoked for failure to properly maintain such barriers or dams or for failure to make the reports and furnish information asked for by the commission.

5. Licenses are obtained by making application to the California Débris Commission, San Francisco, Cal., on the special blank form issued by the commission, copies of which will be sent on request, free of cost.

6. Licenses are not transferable and are valid only for the operations of the individual or company, and for the special mine named in the license.

7. By the terms of the law an application for a license must be advertised by the commission in the newspapers to allow any protests to be filed with the commission. This advertising usually takes about three weeks.

8. As soon as practicable after advertising an application, the sites proposed by the applicants for the restraining works are visited, and if found satisfactory, authority to construct the dams or barriers is given with the commission's specifications and instructions for the work. Any dam built before such authorization is built wholly at the builder's risk, and may not be accepted by the commission. Any variation in location or character of work from that specified by the commission may also cause rejection of the dam.

9. When such authorized dams are completed, the commission should be promptly notified so that an inspection may be made as soon as practicable thereafter. If found satisfactory, a revocable license to mine will be issued. *Until the license is issued it is illegal to mine.*

10. When mining has been begun under a license, a report every month must be submitted on one of the blank forms furnished for this purpose by the commission upon request. If no mining is carried on for any month, the small form is to be used, otherwise, the large form must be forwarded. All blank spaces should be carefully and accurately filled.

11. In case of any accident to a restraining dam affecting its efficiency, mining must immediately cease and the commission must be promptly notified.

12. When a dam becomes full of débris, mining must cease until more impounding capacity is provided either by raising the dam or by the construction of new dams. The permission of the commission must be obtained to raise dams, and the work when completed must be inspected and approved by the commission before mining may be resumed.

13. Dams must be kept water tight and a pool at least three feet deep must be maintained as a settling basin above each dam while mining is in progress. Leaks must be promptly checked.

14. Names of mines must not be changed without due notice to the commission.

15. No charges or fees of any kind are required or allowed, all expenses of inspection being borne by the United States.

16. The mine owners are usually expected to meet the inspector at the nearest railway or stage station and take him to the mine and back. As many regions where mines are located are inaccessible in winter time, applications for licenses and inspections should be submitted as early in the season as practicable. Delay in attending to this promptly may occasion the loss of considerable time if not an entire season.

17. To avoid delay due to loss of letters it is suggested that requests be repeated within a reasonable time, if not promptly acknowledged or acted upon. All communications should be addressed to the secretary, California Débris Commission, San Francisco, Cal.

By direction of the California Débris Commission.

L. H. RAND,
Major, Corps of Engineers, Secretary.

CALIFORNIA STATUTES.

An act to repeal Title XI of Part IV of Division First of the Civil Code and each and every section of said title, and to substitute a new Title XI to take the place thereof in said code, relating to mining corporations.

[Approved March 21, 1905.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. Title XI and Part IV of Division First of the Civil Code and each and every section of said title are hereby repealed, and a new Title XI is substituted in place thereof in said code, to read as follows:

TITLE XI.

MINING CORPORATIONS.

- SEC. 586. Transfer agencies.
587. Stock issued at transfer agencies.
587a. Consolidation of mining corporations.
588. Books and balance sheets to be kept by secretary. Stockholders' right to inspect.
589. Right of stockholders to visit mine with expert.
590. Liability of presidents and directors.

§ 586. Any corporation organized in this state for the purpose of mining or carrying on mining operations in or without this state, may establish and maintain agencies in other states of the United States, for the transfer and issuing of their stock; and a transfer or issue of the same at any such transfer agency, in accordance with the provisions of its by-laws, is valid and binding as fully and effectually for all purposes as if made upon the books of such corporation at its principal office within this state. The agencies must be governed by the by-laws and the directors of the corporation.

§ 587. All stock of any such corporation, issued at a transfer agency, must be signed by the president and secretary of the corporation, and countersigned at the time of its issue by the agent having charge of the transfer agency. No stock must be issued at a transfer agency unless the certificate of stock, in lieu of which the same is issued, is at the time surrendered for cancellation.

§ 587a. It is lawful for two or more corporations formed, or that may hereafter be formed, under the laws of this state, for mining purposes, which own or possess mining claims or lands adjoining each other, or lying in the same vicinity, to consolidate their capital stock, debts, property, assets and franchises, in such manner and upon such terms as may be agreed upon by the respective boards of directors or trustees of such corporations so desiring to consolidate their interests; but no such consolidation must take place without the written consent of the stockholders representing two thirds of the capital stock of each corporation, and no such consolidation can, in any way, relieve such corporations, or the stockholders thereof, from any and all just liabilities; and in case of such consolidation, due notice of the same must be given, by advertising, for one month, in at least one newspaper in the county where the said mining property is situated, if there is one published therein, and also in one newspaper published in the county where the principal place of business of any of said corporation is. And when the consolidation is completed, a certificate thereof, containing the manner and terms of such consolidation, must be filed in the office of the county clerk of the county in which the original certificate of incorporation of each of said corporations is filed, and a copy thereof must be filed in the office of the secretary of state; such certificate must be signed by a majority of each board of trustees or directors of the original corporations, and it is their duty to call, within thirty days after the filing of such certificate, a meeting of the stockholders of all of said corporations so consolidated, to elect a board of trustees or directors for the consolidated corporation, for the year thence next ensuing; and to cause notice of the time and place fixed for such meeting to be

mailed to each stockholder of each of such corporations at his last known place of residence or business at least ten days before the time fixed for such meeting. The said certificate must also contain all the requirements prescribed by section two hundred and ninety.

§ 588. It is the duty of the secretary of every corporation formed for the purpose of mining, or conducting mining in California, whether such corporation be formed and organized under the laws of the State of California or of any other state, territory, or foreign country, to keep at some place within the State of California an office and in such office to keep a complete set of books showing all receipts and expenditures of such corporation, the sources of such receipts, and the objects of such expenditures, and also all transfers of stock. All books and papers must, at all times during business hours, be open to the inspection of any stockholder. He is entitled to be accompanied by an expert, and to make copies or extracts from any such books or papers. He may, at reasonable hours, examine such mining property, accompanied by an expert, take samples, and make such other examination as he may deem necessary. It is the duty of the directors, on the second Monday of each and every month, to cause to be made an itemized account or balance sheet for the previous month, embracing a full and complete statement of all disbursements and receipts, showing from what sources such receipts were derived, and to whom and for what object or purpose such disbursements or payments were made; also all indebtedness or liabilities incurred or existing at the time, and for what the same were incurred, and the balance of money, if any, on hand. Such account or balance sheet must be verified under oath by the president and secretary, and posted in some conspicuous place in the office of the company. It is the duty of the superintendent, on the first Monday of each month, to file with the secretary an itemized account, verified under oath, showing all receipts and disbursements made by him for the previous month, and for what said disbursements were made. Such account must also contain a verified statement showing the number of men employed under him, and for what purpose, and the rate of wages paid to each. He must attach to such account a full and complete report, under oath, of the work done in said mine, the amount of ore extracted, from what part of mine taken, the amount sent to mill for reduction, its assay value, the amount of bullion received, the amount of bullion shipped to the office of the company or elsewhere, and the amount, if any, retained by the superintendent. It is his duty to forward to the office of the company a full report, under oath, of all discoveries of ores or mineral-bearing quartz made in said mine, whether by boring, drifting, sinking, or otherwise, together with the assay value thereof. All accounts, reports, and correspondence from the superintendent must be kept in some conspicuous place in the office of said company, open to the inspection of all stockholders.

§ 589. Any stockholder of a corporation formed under the laws of this state for the purpose of mining, is entitled to visit, accompanied by his expert, and examine the mine or mines owned by such corporation, and every part thereof, at any time he may see fit; and when such stockholder applies to the president of such corporation, he must immediately cause the secretary thereof to issue and deliver to such applicant an order, under the seal of the corporation, directed to the superintendent, commanding him to show and exhibit such parts of said mine or mines as the party named in said order may desire to visit and examine. It is the duty of the superintendent, on receiving such order, to furnish such stockholder every facility for making a full and complete inspection of said mine or mines, and of the workings therein, and to accompany said stockholder either in person, or to furnish some person familiar with said mine or mines to accompany him in his visit to and through such mine or mines, and every part thereof. If the superintendent fails to obey such order, such stockholder is entitled to recover, in any court of competent jurisdiction, against the corporation, the sum of one thousand dollars, and traveling expenses to and from the mine, as liquidated damages, together with costs of suit. In case of such refusal, it is the duty of the directors of the corporation forthwith to remove the officer so refusing, and thereafter he must not be employed directly or indirectly by the corporation, nor must any salary be paid to him.

§ 590. In case of the refusal or neglect of the president to cause to be issued by the secretary the order mentioned in section five hundred and eighty-nine, such stockholder is entitled to recover against said president the sum of one thousand dollars and costs, as provided in the last section. If the directors fail to have the reports and accounts current made and posted as provided in section five hundred and eighty-eight, they are liable, either severally or jointly, to an action by any stockholder complaining thereof, and on proof of such refusal or failure, he may recover judgment for actual damages sustained by him, with costs of suit. Each of such defaulting directors is also liable to removal for such neglect.

CORPORATION LICENSE TAX LAW.

As approved March 20, 1905; amended, approved June 13, 1906; amended, approved March 19, 1907; amended, approved March 20, 1907; amended, approved March 19, 1909; amended, approved April 24, 1911; amended, approved May 30, 1913.

SECTION 1. No corporation heretofore or hereafter incorporated under the laws of this state, or of any other state, shall do or attempt to do business by virtue of its charter or certificate of incorporation, in this state, without a state license therefor. *Amended, approved June 13, 1906.*

SEC. 2. It shall be the duty of every corporation incorporated under the laws of this state, and of every foreign corporation now doing business, or which shall hereafter engage in business in this state, to procure annually from the secretary of state a license authorizing the transaction of such business in this state, and shall pay therefor a license tax as follows:

When the authorized capital stock of the corporation does not exceed ten thousand dollars (\$10,000) the tax shall be ten dollars (\$10.00); when the authorized capital stock exceeds ten thousand dollars (\$10,000) but does not exceed twenty thousand dollars (\$20,000) the tax shall be fifteen dollars (\$15.00); when the authorized capital stock exceeds twenty thousand dollars (\$20,000) but does not exceed fifty thousand dollars (\$50,000) the tax shall be twenty dollars (\$20.00); when the authorized capital stock exceeds fifty thousand dollars (\$50,000) but does not exceed one hundred thousand dollars (\$100,000) the tax shall be twenty-five dollars (\$25.00); when the authorized capital stock exceeds one hundred thousand dollars (\$100,000) but does not exceed two hundred and fifty thousand dollars (\$250,000) the tax shall be fifty dollars (\$50.00); when the authorized capital stock exceeds two hundred and fifty thousand dollars (\$250,000) but does not exceed five hundred thousand dollars (\$500,000) the tax shall be seventy-five dollars (\$75.00); when the authorized capital stock exceeds five hundred thousand dollars (\$500,000) but does not exceed two million dollars (\$2,000,000) the tax shall be one hundred dollars (\$100.00); when the authorized capital stock exceeds two million dollars (\$2,000,000) but does not exceed five million dollars (\$5,000,000) the tax shall be two hundred dollars (\$200.00); when the authorized capital stock exceeds five million dollars (\$5,000,000) the tax shall be two hundred and fifty dollars (\$250.00).

Said license tax or fee shall be due and payable on the first day of July of each and every year to the secretary of state, who shall pay the same into the state treasury. If not paid on or before the hour of four o'clock p. m. of the first day of September next thereafter, the same shall become delinquent and there shall be added thereto, as a penalty for such delinquency, the sum of ten dollars.

The license tax or fee hereby provided authorizes the corporation to transact its business during the year or for any fractional part of such year in which such license tax or fee is paid. "Year," within the meaning of this act, means from and including the first day of July to and including the thirtieth day of June next thereafter. *Amended, approved March 19, 1907.*

SEC. 2a. At the time of filing a certified copy of articles of incorporation of any corporation when filed on or between the first day of July and the thirtieth day of September, in any year, there shall be paid, in addition to all other fees required by law to be paid to the secretary of state, the full amount of the license tax provided to be paid in section two of this act; when filed on or between the first day of October and the thirty-first day of December, in any year, a sum equal

to three fourths of the license tax provided for in section two of this act shall be paid; when filed on or between the first day of January and the thirty-first day of March, in any year, a sum equal to one half of such license tax provided for in section two of this act shall be paid, and when filed on or between the first day of April and the thirtieth day of June, in any year, a sum equal to one fourth of such license tax provided for in section two of this act shall be paid. Upon receipt of such full or fractional license tax the secretary of state shall issue a license receipt for the full or for the fractional part of the then current fiscal year. *Amended, approved March 19, 1909 (in effect July 1, 1909).*

SEC. 3. The secretary of state shall, on or before the fifteenth day of September in each year, report to the governor of the state a list of all corporations which have become delinquent, as provided in section two of this act, and the governor shall forthwith issue his proclamation, declaring under this act that the charters of such delinquent domestic corporations will be forfeited and the right of such foreign corporations to do business in this state will be forfeited unless payment of said license tax, together with the penalty for such delinquency, as hereinbefore provided, be made to the secretary of state on or before the hour of four o'clock p. m. of the thirtieth day of November next following. *Amended, approved June 13, 1906.*

SEC. 4. Said proclamation shall be filed immediately in the office of the secretary of state, and said secretary of state shall immediately cause a copy of said proclamation to be published in one issue of each of two daily newspapers to be selected by the governor. *Amended, approved June 13, 1906.*

SEC. 5. At the hour of four o'clock p. m. of the thirtieth day of November each year the charters of all delinquent domestic corporations which have failed to pay the said license tax, together with said penalty for such delinquency, shall be forfeited to the State of California, and the right of all delinquent foreign corporations to do business in this state, which have failed to pay said license tax, together with the penalty for such delinquency, shall be likewise forfeited. *Amended, approved June 13, 1906.*

SEC. 6. Any corporation which failed to pay the license tax and penalty required by the act, or any amendment thereof, and of which this is amendatory, may pay all the said license taxes and penalties prescribed by section one of said act and the amendments thereto, and the license taxes and penalties that would have accrued if such corporation had not forfeited its charter or right to do business and any such corporation making such payment shall be relieved from the forfeiture prescribed by the act of which this act is amendatory, and all persons exercising the powers of any such corporation making such payment shall be relieved from the provisions of section nine of said act of which this act is amendatory, and the secretary of state shall immediately after the first day of December in each year, transmit to the county clerk of each county in this state a list of the corporations so paying pursuant to the provisions of this section, which list shall be by said county clerk filed in his office; *provided*, the rehabilitation of a corporation under the provisions of this act shall be without prejudice to any action, defense or right which accrued by reason of the original forfeiture; *and provided*, that in case the name of any corporation which has suffered the forfeiture prescribed by the act of which this act is amendatory, or a name so closely resembling the name of such corporation as will tend to deceive, has been adopted by any other corporation since the date of said forfeiture then said corporation having suffered said forfeiture shall be relieved therefrom pursuant to the terms of this section of this act only upon the adoption by said corporation seeking revivor of a new name, and in such case nothing in this act contained shall be construed as permitting such corporation to be revived or carry on any business under its former name; and such corporation shall have the right to use its former name or take such new name only upon filing an application therefor with the secretary of state and upon the issuing of a certification to such corporation by the secretary of state setting forth the right of such corporation to take such new name or use its former name as the case may be; *provided, however*, that the secretary of state shall not issue any certificate permitting any corporation to take or use the name of any corporation heretofore organized in this state and which has not suffered the forfeiture prescribed by the

act of which this act is amendatory, or to make or use a name so closely resembling the name of such corporation heretofore organized in this state as will tend to deceive. The provisions of title IX, part III of the Code of Civil Procedure in so far as they conflict with this section of this act are not applicable to corporations seeking revivor under this act. *Amended, approved May 30, 1913.*

SEC. 7. All educational, religious, scientific and charitable corporations, and all corporations which are not organized for pecuniary profit, are exempt from the provisions of this act. *Amended, approved June 13, 1906.*

SEC. 8. On or before the thirty-first day of December of each year the secretary of state shall make a list of all domestic corporations whose charters have been so forfeited and of all foreign corporations whose right to do business in this state has been so forfeited, and shall transmit a certified copy thereof to each county clerk in this state, who shall file the same in his office. *Amended, approved June 13, 1906.*

SEC. 9. It shall be unlawful for any corporation, delinquent under this act, either domestic or foreign, which has not paid the license tax or fee, together with the penalty for such delinquency, as in this act prescribed, to exercise the powers of such corporation, or to transact any business in this state, after the thirtieth day of November next following the delinquency. Each and every person who exercises any of the powers of a corporation so delinquent, whether domestic or foreign, which has not paid the license tax, together with the penalty for such delinquency, or who transacts any business for or in behalf of such corporation, after the thirtieth day of November next following the delinquency, shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than one hundred dollars, and not exceeding one thousand dollars, or by imprisonment in the county jail not less than fifty days nor more than five hundred days, or by both such fine and imprisonment. *Amended, approved June 13, 1906.*

SEC. 10a. In all cases of forfeiture under the provisions of this act, the directors or managers in office of the affairs of any domestic corporation, whose charter may be so forfeited, or of any foreign corporation whose right to do business in this state may be so forfeited, are deemed to be trustees of the corporation and stockholders or members of the corporation whose power or right to do business is forfeited and have full power to settle the affairs of the corporation and to maintain or defend any action or proceeding then pending in behalf of or against any of said corporations, or to take such legal proceedings as may be necessary to fully settle the affairs of said corporation, and such directors or managers, as such trustees, may be sued in any of the courts of this state by any person having a claim against any of said corporations; *provided, always,* that no action pending against any corporation shall abate thereby, but may be prosecuted to final judgment the same may be enforced by execution with the same force and effect and in like manner as though no forfeiture had occurred; *and provided, further,* that where judgment has been entered against any corporation prior to forfeiture under this act, that notwithstanding execution may be issued thereon and the property of said corporation, or which may come into the hands of any trustees for it may be levied upon, seized and sold to satisfy the same with like force and effect as though such forfeiture has not occurred. *Amended, approved March 20, 1907.*

CHAPTER 336.

An act to repeal an act entitled "An act relating to revenue and taxation, providing for a license tax upon corporations and making an appropriation for the purpose of carrying out the objects of this act," approved March 20, 1905, and all acts amendatory thereof or supplemental thereto, and to provide upon what conditions any corporation which has failed to pay any license tax imposed by the provisions of any of the acts hereby repealed may pay the same and be restored to its former corporate status and rights, and also to provide for settling the affairs of any corporation which by reason of failure to pay any tax imposed by any of said acts, has forfeited either its charter or right to do business in this state.

(Approved June 10, 1913. In effect June 30, 1914.)

The People of the State of California do enact as follows:

SECTION 1. An act entitled "An act relating to revenue and taxation, providing for a license tax upon corporations and making an appropriation for the purpose

of carrying out the objects of this act," approved March 20, 1905, and also all acts amendatory thereof or supplemental thereto, are hereby repealed; *provided, however*, that this act shall not be construed to affect the status of any corporation which has before the taking effect of this act, by reason of failure to pay any tax in accordance with the terms of any of the acts hereby repealed, forfeited either its charter or right to do business in this state. Nor shall this act be construed to relieve any corporation or person from any penalty or penal provision of any of the acts hereby repealed except as herein provided.

SEC. 2. Any corporation which has failed to pay the license tax required by the provisions of any of the acts hereby repealed, may pay to the secretary of state all taxes and penalties prescribed by either of said acts and the license tax and penalties that would have accrued if such corporation had not forfeited its charter or right to do business in this state, and any such corporation making such payments shall thereupon be relieved from the forfeiture prescribed in any of the acts hereby repealed and restored to its former corporate rights and status and the secretary of state shall annually in the month of December transmit to the county clerk of each county a list of the corporations so paying, which list shall be by said county clerk filed in his office; *provided*, the rehabilitation of any such corporation by reason of making such payments shall be without prejudice to any action, defense, or right which accrued by reason of the original forfeiture.

SEC. 3. The powers conferred by the provisions of section 10a of the act hereby repealed (as amended March 20, 1907) upon the directors or managers of any such corporation in office at the time of any such forfeiture are hereby continued in force and said trustees or managers shall notwithstanding the taking effect of this act have full power as trustees to settle the affairs of any such corporation and to maintain or defend any action or proceeding then pending in behalf of or against any such corporation or to take such legal proceedings as may be necessary to fully settle its affairs and such directors or managers as such trustees may be sued in any of the courts of this state by any person having a claim against any such corporation; *provided, always*, that no action pending against any such corporation shall abate thereby but may be brought to final judgment and may be enforced by execution and to the same force and effect and in like manner as though no forfeiture has occurred; *and provided, further*, that where judgment has been entered against any corporation prior to forfeiture under the provisions of any of the acts hereby repealed notwithstanding such forfeiture execution may be issued on any such judgment, and the property of such corporation or which may come into the hands of any trustees for it, may be levied upon, seized and sold to satisfy such judgment with like force and effect as though such forfeiture had not occurred.

SEC. 4. This act shall take effect and be in force June 30, 1914, at twelve o'clock m.

PROTECTION OF STOCKHOLDERS.

An act to amend an act entitled "An act to protect stockholders and persons dealing with corporations in this state," approved March 29, 1878, and all acts amendatory thereof, and to repeal all laws in conflict therewith.

[Approved March 22, 1905.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. Any superintendent, director, secretary, manager, agent, or other officer, of any corporation formed or existing under the laws of this state, or transacting business in the same, and any person pretending or holding himself out as such superintendent, director, secretary, manager, agent, or other officer, who shall wilfully subscribe, sign, endorse, verify, or otherwise assent to the publication, either generally or privately, to the stockholders or other persons dealing with such corporation, or its stock, any untrue or wilfully and fraudulently exaggerated report, prospectus, account, statement of operations, values, business, profits, expenditures or prospects, or other paper or document intended to produce or give, or having

a tendency to produce or give, to the shares of stock in such corporation a greater value or less apparent or market value than they really possess, or with the intention of defrauding any particular person or persons, or the public, or persons generally, shall be deemed guilty of a felony, and on conviction thereof shall be punished by imprisonment in state prison or a county jail not exceeding two years, or by fine not exceeding five thousand dollars, or by both.

SEC. 2. All acts and parts of acts in conflict with this act are hereby repealed.

CIVIL CODE.

§ 309. The directors of corporations must not make dividends, except from the surplus profits arising from the business thereof; nor must they create any debts beyond their subscribed capital stock; nor must they divide, withdraw or pay to the stockholders, or any of them, any part of the capital stock, except as hereinafter provided, nor reduce or increase the capital stock, except as herein specially provided. For a violation of the provisions of this section, the directors under whose administration the same may have happened (except those who may have caused their dissent therefrom to be entered at large on the minutes of the directors at the time, or were not present when the same did happen) are, in their individual or private capacity, jointly and severally liable to the corporation, and to the creditors thereof, to the full amount of the capital stock so divided, withdrawn, paid out, or reduced, or debt contracted; and no statute of limitation is a bar to any suit against such directors for any sums for which they are liable by this section; *provided, however*, that where a corporation has been heretofore or may hereafter be formed for the purpose, among other things, of acquiring, holding, and selling real estate, water, and water rights, the directors of such corporation may, with the consent of stockholders representing two thirds of the capital stock thereof, given at a meeting called for that purpose, divide among the stockholders the land, water or water rights so by such corporation held, in the proportions to which their holdings of such stock at the time of such division entitled them. All conveyances made by the corporation in pursuance of this section must be made and received subject to the debts of such corporation existing at the date of the conveyance thereof. Nothing herein prohibits a division and distribution of the capital stock of any corporation which remains after the payment of all its debts, upon its dissolution, or the expiration of its term of existence.

PENAL CODE.

§ 560. Every director of any stock corporation who concurs in any vote or act of the directors of such corporation or any of them, by which it is intended, either—

1. To make any dividend, except from the surplus profits arising from the business of the corporation, and in the cases and manner allowed by law; or,
2. To provide, withdraw, or in any manner, except as provided by law, pay to the stockholders, or any of them, any part of the capital stock of the corporation; or,
3. To discount or receive any note or other evidence of debt in payment of any installment actually called in and required to be paid, or with the intent to provide the means of making such payment; or,
4. To receive or discount any note or other evidence of debt, with the intent to enable any stockholder to withdraw any part of the money paid in by him, or his stock; or,
5. To receive from any other stock corporation, in exchange for the shares, notes, bonds, or other evidences of debt of their own corporation, shares of the capital stock of such other corporation, or notes, bonds, or other evidence of debt issued by such other corporation;—is guilty of a misdemeanor.

TO PREVENT WASTING OF NATURAL GAS.

An act prohibiting the unnecessary wasting of natural gas into the atmosphere; providing for the capping or otherwise closing of wells from which natural gas flows; and providing penalties for violating the provisions of this act.

[Approved March 25, 1911.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. All persons, firms, corporations and associations are hereby prohibited from wilfully permitting any natural gas wastefully to escape into the atmosphere.

SEC. 2. All persons, firms, corporations or associations digging, drilling, excavating, constructing or owning or controlling any well from which natural gas flows shall upon the abandonment of such well, cap or otherwise close the mouth of or entrance to the same in such a manner as to prevent the unnecessary or wasteful escape into the atmosphere of such natural gas. And no person, firm, corporation or association owning or controlling land in which such well or wells are situated shall wilfully permit natural gas flowing from such well or wells, wastefully or unnecessarily to escape into the atmosphere.

SEC. 3. Any person, firm, corporation or association who shall wilfully violate any of the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not more than one thousand dollars or by imprisonment in the county jail for not more than one year, or by both such fine and imprisonment.

SEC. 4. For the purposes of this act each day during which natural gas shall be wilfully allowed wastefully or unnecessarily to escape into the atmosphere shall be deemed a separate and distinct violation of this act.

SEC. 5. All acts or parts of acts in conflict herewith are hereby repealed.

SEC. 6. This act shall take effect immediately

PROTECTION OF OIL AND GAS STRATA.

An act to prevent injury to oil, gas or petroleum-bearing strata or formations by the penetration or infiltration of water therein.

[Approved March 20, 1909.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. It shall be the duty of the owner of any well now drilled or that may be drilled in the State of California on lands producing or containing oil, gas or petroleum, to properly case such well or wells, with metal casing in accordance with most approved methods, and to effectually shut off all water overlying or underlying the oil-bearing strata and to effectually prevent any water from penetrating such oil-bearing strata.

SEC. 2. It shall be the duty of the owner of any well referred to in section one of this act, before abandoning the same to withdraw the casing therefrom, and to securely fill such well with clay, earth or cement mortar, or other good and sufficient materials, used alone or in suitable combination, and thoroughly pack and tamp the same into such well to a point as far above the upper oil-bearing strata as the commissioner hereinafter provided for may decide shall be necessary, and while withdrawing the casing therefrom to effectually and permanently shut off and exclude all water underlying and overlying said oil-bearing strata, and to the satisfaction of the commissioner, whether any oil-bearing strata has been encountered or not.

SEC. 3. It shall be the duty of the owner of any well referred to in section one of this act, to keep a careful and accurate log of the drilling of such well, such log to show the character and depth of the formations passed through or encountered in the drilling of such well, and particularly to show the location and depth of the water-bearing strata, together with the character of the water encountered from time to time, and to show at what point such water was shut off, if at all, and if not to so state in such log, and show the depth at which oil-bearing strata is

encountered, the depth and character of the same, and whether all water overlying and underlying such oil-bearing strata was successfully and permanently shut off so as to prevent the percolation or penetration into such oil-bearing strata; said record of well to be kept on file and subject to the inspection of hereinafter mentioned commissioner at any time during business hours.

SEC. 4. The term "owner" as herein used shall mean and include each and every person, persons, partnership, copartnership, association or corporation owning, leasing, managing, operating, drilling or possessing any well mentioned in sections one and two of this act, either as principal or principals, lessee or lessees of such principal or principals, contractor or contractors, and their and each of their employees. The term "oil-bearing strata" as herein used shall mean and include any bed, seam or stratum of rock or sand or other material which contains, includes, or yields earth oil, rock oil, or petroleum oil or natural gas or either of them.

In order to carry out the provision of sections one and two of this act, upon petition of three or more operating oil companies, within the county, it shall be the duty of the board of supervisors of said county to appoint a commissioner who shall be a practical oil man, whose term of office shall be until December 31st of the year following time of appointment or until his successor is appointed.

The duties of said commissioner shall be to see that the provisions of this act shall be enforced.

The compensation of said commissioner shall be fixed by the board of supervisors and shall be paid out of the general county fund.

Upon the filing of a complaint with said commissioner alleging the violation of any of the provisions of sections one or two of this act, it shall be the duty of the hereinbefore mentioned commissioner of the county, if so requested by the complainants, to make or cause to be made, a thorough investigation of the well in question, to determine whether or not any of the provisions of this act have been violated and for such purpose he is hereby empowered to appoint all necessary agents and assistants to conduct such examination and such agents and assistants may enter upon the premises where such well is situated and may take charge of such well for the purpose of making such investigations. If the defendant in the action shall be convicted of a violation of any of the provisions of sections one or two of this act, he shall, in addition to the penalties hereafter set forth, pay all reasonable and proper costs incident to the making of such investigations.

Any well drilled and abandoned, in violation of sections one or two of this act, is hereby declared a public nuisance.

If any well, under the provisions of sections one or two of this act be declared a public nuisance, it shall be the duty of commissioner of the county in which such well is situated to enter upon the premises, take possession of such well and to abate said nuisance and to take all necessary steps to prevent the percolation or penetration of water into the oil-bearing strata. He shall keep an accurate account of the expense of such work and all expenses so incurred shall be a charge against the owner of such well and a lien upon the same.

Any person violating the provisions of this act shall be guilty of a misdemeanor.

Any owner of any well referred to in sections one or two of this act, who refuses to permit the commissioner to inspect the same or who wilfully hinders or delays the commissioner in the performance of his duty is guilty of a misdemeanor.

An "act" to prevent injury to oil, or petroleum-bearing strata, or formations by infiltration or intrusion of water therein, approved March 24, 1903, is hereby repealed.

USE OF CALIFORNIA MATERIALS IN CALIFORNIA PUBLIC BUILDINGS.

Section 3247 of the Political Code.

"Any person, committee, board, officer, or any other person charged with the purchase, or permitted or authorized to purchase, supplies, goods, wares, merchandise, manufactures, or produce, for the use of the state, or any of its institutions or offices, or for the use of any county or consolidated city and county, or city, or town, shall

always, price, fitness and quality being equal, prefer such supplies, goods, wares, merchandise, manufactures, or produce as has been grown, manufactured or produced in this state, and shall next prefer such as have been partially so manufactured, grown or produced in this state. All state, county, city and county, city or town officers, all boards, commissions, or other persons charged with advertising for any such supplies, shall state in their advertisement that such preferences will be made. In any such advertisement no bid shall be asked for any article of a specific brand or mark nor any patent apparatus or appliances, when such requirement would prevent proper competition on the part of dealers in other articles of equal value, utility or merit."

LANDS UNCOVERED BY RECESSION OF WATER.

An act to amend section 3493m of the Political Code relating to land uncovered by the recession or drainage of the waters of inland lakes.

[Approved April 14, 1911.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. Section 3493m of the Political Code is hereby amended to read as follows:

Section 3493m. Any person desiring to purchase any of the lands now uncovered or which may hereafter be uncovered by the recession or drainage of the waters of inland lakes, and inuring to the state by virtue of her sovereignty, or the swamp and overflowed lands not segregated by the United States, must make an application therefor to the surveyor general of the state, which application must be accompanied by the applicant's affidavit that he is a citizen of the United States, or has declared his intention to become such, a resident of this state, of lawful age, that he desires to purchase such lands (describing them by legal subdivisions, or by metes and bounds, if the legal subdivisions are unknown), under the provisions of this article, for his own use and benefit, and for the use and benefit of no other person whomsoever, and that he has made no contract or agreement to sell the same, and that he does not own any state lands which, together with that now sought to be purchased, exceed six hundred and forty acres.

The provisions of this section shall not affect or apply to any land uncovered by the recession or drainage of the waters of any lake or other body of water, the waters of which are so impregnated with minerals as to be valuable for the purpose of extracting therefrom such minerals; but the land uncovered by the recession or drainage of such waters shall be subject to lease for periods of not longer than twenty-five years upon such charges, terms and conditions as may be prescribed by law.

SEC. 2. All acts or parts of acts in conflict herewith are hereby repealed.

SEC. 3. This act shall take effect immediately.

EXTRACTION OF MINERALS FROM WATER.

An act regulating the extraction of minerals from the waters of any stream or lake and prohibiting the extraction of minerals from said waters except under lease from or express permission of the state for a period not exceeding twenty-five years.

[Approved April 14, 1911.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. Minerals contained in the waters of any stream or lake in this state shall not be extracted from said waters except upon charges, terms and conditions prescribed by law. No person, firm, corporation or association shall hereafter gain the right to extract or cause to be extracted said minerals from said waters by user, custom, prescription, appropriation, littoral rights, riparian rights, or in any manner

other than by lease from or express permission of the state as prescribed by law; and no such lease or permission shall be granted for a longer period than twenty-five years.

SEC. 2. All acts or parts of acts in conflict herewith are hereby repealed.

SEC. 3. This act shall take effect immediately.

HYDRAULIC MINING.

Where hydraulic mining can be carried on.

§ 1424. The business of hydraulic mining may be carried on within the State of California wherever and whenever the same can be carried on without material injury to the navigable streams, or the lands adjacent thereto.

Meaning of hydraulic mining.

§ 1425. Hydraulic mining, within the meaning of this title, is mining by the means of the application of water, under pressure, through a nozzle, against a natural bank.

MINERAL LANDS WITHIN MEANDER LINES OF LAKES AND STREAMS.

An act relating to lakes and streams, the waters of which contain minerals in commercial quantities; withdrawing state lands within the meander lines thereof from sale; prescribing conditions for taking such minerals from said waters and lands, and providing for the leasing of lands uncovered by the recession of the waters of such lakes and streams.

[Approved April 27, 1911.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. There is hereby withdrawn from selection and sale all of the lands embraced within the original meander lines of streams and lakes belonging to the state, the waters of which contain minerals in commercial quantities, and all such lands which may hereafter inure to the state by virtue of its sovereignty, excepting such lands now contracted to be sold under sections 3493 m to 3493 t , both inclusive, of the Political Code.

SEC. 2. No person, firm or corporation shall take water from such streams or lakes containing minerals and extract from such water such minerals, except under the terms and conditions of this act; and no person, firm or corporation may lease any land herein referred to and extract therefrom minerals deposited therein or thereon, except under the terms and conditions of this act.

SEC. 3. Every person, firm or corporation taking from the waters of such stream, lakes or lands any minerals, shall file, on or before the last Monday in January of each year, with the county assessor of the county in which any such stream or lake is situated, and also with the state controller, a written statement, duly verified, showing in tons of two thousand pounds, the amount of mineral taken by such person, firm or corporation from such water or land during the year ending December 31st last preceding, and sold by said person, firm or corporation during the said year preceding. Any such person, firm or corporation neglecting or refusing to furnish such statement shall be subject to a fine of one hundred dollars for each day after the said last Monday in January such person, firm or corporation, shall fail to furnish such statement, and, in addition to said fine, shall forfeit all leases granting the right to extract such minerals from said water and said land. Any person who shall, either on behalf of himself or any firm or corporation, verify any such statement which shall be untrue in any material part, shall be deemed guilty of a misdemeanor.

SEC. 4. In case either the assessor or the state controller shall not be satisfied with the statement as returned, he may make an examination of the matters necessary to verify or correct said statement, and, for that purpose, may subpoena witnesses and call for and compel the production of necessary books and papers belonging to the person, firm or corporation making the returns.

SEC. 5. The county assessor of the county shall, after examination and approval by him and the state controller of such statement, proceed to collect from such person, firm or corporation a royalty of twenty-five cents for each ton of two thousand pounds of mineral taken from such water or land by such person, firm or corporation and sold, during the preceding year, in the manner provided for the collection of personal property taxes; *provided*, that the royalty on sodium bicarbonate and on sodium hydrate so taken shall be fifty (50) cents for each ton of two thousand pounds.

SEC. 6. Any person, firm or corporation desiring to lease any lands under this act must make application therefor to the surveyor general of the state, describing the lands sought to be leased by legal subdivisions, or if the legal subdivisions are unknown to the applicant by metes and bounds. The application must be accompanied by a filing fee of ten dollars.

SEC. 7. Upon the receipt of such application, the surveyor general shall direct the county surveyor of the county in which such lands are situated to survey the land sought to be leased. The county surveyor shall make an actual survey of the land, at the expense of the applicant, establishing the four corners to each quarter section, and connecting the same with a United States survey; and, within thirty days file with the surveyor general a copy, under oath, of his field notes and plat. If the county surveyor fails to make the survey as herein provided, the surveyor general shall immediately direct another person to make the survey at the expense of the applicant, and said survey shall be made and completed within thirty days after the authorization, and the field notes and plats, or copies thereof, shall be sworn to by the surveyor making them and shall be filed with the surveyor general.

SEC. 8. All applications to lease land under this act shall be approved or rejected by the surveyor general within ninety days after the receipt thereof. Immediately after the approval of the application, the surveyor general shall execute and deliver to the applicant a lease of the lands described in the application.

SEC. 9. The lands designated in this act shall be leased at the rate of two dollars and fifty cents per acre, per year, payable yearly in advance. All moneys received as rental for such lands and as royalty upon the mineral product of the waters of the lakes, streams or lands above mentioned, shall be paid into the state school land fund.

SEC. 10. Whenever any lease is delivered to the applicant by the surveyor general, the lessee shall within fifteen days thereafter, present said lease to the treasurer of the State of California, and make payment of the first annual rental. The treasurer shall receive the money and give a receipt therefor. All subsequent annual payments of rental must be paid to the state treasurer, in like manner, within fifteen days after they become due. In case payments are not made as herein provided, the lease and all rights thereunder shall cease and terminate. No lease shall run for more than twenty-five years; *provided*, that upon the expiration of any lease, such lease may be extended for a period of twenty-five years upon such terms and conditions as may then be prescribed by law.

SEC. 11. All leases made under the authority of this act shall contain a reservation to the state of a right to locate rights of way across such leased lands, subject only to the requirements that the rights of way shall be located in such manner as to cause the least injury to the leased lands across which the same may be located, and that any damage suffered by the lessee of such lands shall be compensated by the lessee of the lands for whose benefit the right of way is required; and every such lease shall be subject to, and shall contain a reservation of, the right of any city and county or incorporated city or town of this state to at any time appropriate and take, under the laws of this state relative to the appropriation of waters, water from any stream or lake tributary to or discharging into any stream or lake of the character mentioned in section one of this act, for any use or uses within the authorized powers of such city and county, or incorporated city or town.

SEC. 12. Leases of rights of way, not exceeding one hundred feet in width, for access to any water or lands designated by this act, may be applied for and granted in the manner herein provided for leasing lands. Such rights of way shall be leased

at an annual rental of two dollars and fifty cents an acre, and the same shall be paid as herein provided for leased lands.

SEC. 13. All leases of mineral lands provided for by this act shall cease and terminate on December 31st of any year if the lessee or assigns has not, during the year preceding, extracted or removed from such land and water an amount of mineral equal, in the aggregate, to a minimum of five tons per acre of land leased; *provided*, that when a lease is not delivered to the lessee until after the fifteenth day of January of any year, the minimum tonnage for such year shall be less than five (5) tons, and shall be proportional to the number of days remaining in such year after the completion of the works.

SEC. 14. The surveyor general is hereby authorized to prepare, make, execute and deliver all papers, instruments and documents, and to do any and all things necessary to carry out the provisions of this act.

SEC. 15. The legislature shall have the right to change, from time to time, the royalty per ton of minerals extracted and the annual rental per acre of land, and such change shall apply to all persons, firms or corporations holding leases hereinunder; *provided*, that no lease given under this act shall be subject to any change, as to the royalty or rental provided for in said lease, subsequent to the execution of such lease until after ten years from the passage of this act.

SEC. 16. Any lessee hereinunder may abandon and surrender a lease at the expiration of any calendar year by filing with the county assessor of the county in which is situated the lands described in said lease, and with the surveyor general and the state controller, notices of said abandonment or surrender; but said notices must be filed at least sixty days before the expiration of said calendar year; and said abandonment and surrender shall not absolve the said lessee from the payment of any royalty which may be due at the end of said fiscal year, for minerals extracted from the waters or lands in this act specified.

SEC. 17. This act shall take effect immediately.

THE RIGHT OF EMINENT DOMAIN.

An act to amend section twelve hundred and thirty-eight of the Code of Civil Procedure, relating to the purposes for which the right of eminent domain may be exercised, and repealing all acts and parts of acts in conflict with this act.

[Approved April 28, 1911.]

SECTION 1. Section twelve hundred and thirty-eight of the Code of Civil Procedure is hereby amended to read as follows:

§ 1238. Subject to the provisions of this title, the right of eminent domain may be exercised in behalf of the following public uses:

4. Wharves, docks, piers, chutes, booms, ferries, bridges, toll roads, by-roads, plank, and turnpike roads; paths and roads either on the surface, elevated, or depressed, for the use of bicycles, tricycles, motor cycles and other horseless vehicles, steam, electric, and horse railroads, canals, ditches, dams, poundings, flumes, aqueducts and pipes for irrigation, public transportation, supplying mines and farming-neighborhoods with water, and draining and reclaiming lands, and for floating logs and lumber on streams not navigable.

5. Roads, tunnels, ditches, flumes, pipes and dumping places for working mines; also outlets, natural or otherwise, for the flow, deposit, or conduct of tailings or refuse matter from mines; also an occupancy in common by the owners or possessors of different mines of any place for the flow, deposit, or conduct of tailings or refuse matter from their several mines.

6. By-roads leading from highways to residences, farms, mines, mills, factories and buildings for operating machinery, or necessary to reach any property used for public purposes.

7. Telegraph and telephone lines, systems and plants.

9. Roads for transportation by traction engines or road locomotives.

10. Oil pipe lines.

11. Roads and flumes for logging or lumbering purposes.

12. Canals, reservoirs, dams, ditches, flumes, aqueducts and pipes and outlets natural or otherwise for supplying, storing and discharging water for the operation of machinery for the purpose of generating and transmitting electricity for the supply of mines, quarries, railroads, tramways, mills, and factories with electric power; and also for the applying of electricity to light or heat mines, quarries, mills, factories, incorporated cities and counties, villages or towns; and also for furnishing electricity for lighting, heating or power purposes to individuals or corporations, together with lands, buildings and all other improvements in or upon which to erect, install, place, use or operate machinery for the purpose of generating and transmitting electricity for any of the purposes or uses above set forth.

SEC. 2. All acts and parts of acts in conflict with this act are hereby repealed.

SEC. 3. This act shall take effect immediately.

An act to amend section 1239 of the Code of Civil Procedure, relating to proceedings to exercise the right of eminent domain.

[Approved April 5, 1911.]

SECTION 1. Section 1239 of the Code of Civil Procedure of the State of California, is hereby amended to read as follows:

§ 1239. The following is a classification of the estates and rights in lands subject to be taken for public use:

1. A fee simple, when taken for public buildings or grounds, or for permanent buildings, for reservoirs and dams, and permanent flooding occasioned thereby, or for an outlet for a flow, or a place for the deposit of debris or tailings of a mine.

* * *

LOCATION OF MINING CLAIMS, MILL SITES, AND ASSESSMENT WORK.

An act to amend the Civil Code of California by adding a new title thereto, to be numbered title X, in part IV of division second, consisting of sections 1426, 1426a, 1426b, 1426c, 1426d, 1426e, 1426f, 1426g, 1426h, 1426i, 1426j, 1426k, 1426l, 1426m, 1426n, 1426o, 1426p, 1426q, 1426r, and 1426s, providing for the manner of locating lode and placer mining claims, tunnel rights, mill sites, and prescribing the character and amount of assessment work on mining claims, and providing for proofs of such work, and for the recordation of location notices, and proof of labor, and for the enforcement of contributions from delinquent co-owners of mining claims, and prescribing the duties of county recorders respecting the recording of location notices of, and proofs of labor on, mining claims, tunnel rights, and mill sites, and the fees to be charged therefor, and repealing acts in conflict herewith.

[Approved March 13, 1909.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. The Civil Code of the State of California is hereby amended by adding a new title thereto, to be numbered title X, in part IV of second division, consisting of sections 1426, 1426a, 1426b, 1426c, 1426d, 1426e, 1426f, 1426g, 1426h, 1426i, 1426j, 1426k, 1426l, 1426m, 1426n, 1426o, 1426p, 1426q, 1426r, and 1426s, to read as follows:

§ 1426. Any person, a citizen of the United States, or who has declared his intention to become such, who discovers a vein or lode of quartz, or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposit, may locate a claim upon such vein or lode, by defining the boundaries of the claim, in the manner hereinafter described, and by posting a notice of such location, at the point of discovery, which notice must contain:

First—The name of the lode or claim.

Second—The name of the locator or locators.

Third—The number of linear feet claimed in length along the course of the vein, each way from the point of discovery, with the width on each side of the center of the claim, and the general course of the vein or lode, as near as may be.

Fourth—The date of location.

Fifth—Such a description of the claim by reference to some natural object, or permanent monument, as will identify the claim located.

§ 1426a. The locator must define the boundaries of his claim so that they may be readily traced, and in no case shall the claim extend more than fifteen hundred feet along the course of the vein or lode, nor more than three hundred feet on either side thereof, measured from the center line of the vein at the surface.

§ 1426b. Within thirty days after the posting of his notice of location upon a lode mining claim, the locator shall record a true copy thereof in the office of the county recorder of the county in which such claim is situated, for which service the county recorder shall receive a fee of one dollar.

§ 1426c. The location of a placer claim shall be made in the following manner: By posting thereon, upon a tree, rock in place, stone, post or monument, a notice of location, containing the name of the claim, name of locator or locators, date of location, number of feet or acreage claimed, such a description of the claim by reference to some natural object or permanent monument as will identify the claim located, and by marking the boundaries so that they may be readily traced: *provided*, that where the United States survey has been extended over the land embraced in the location, the claim may be taken by legal subdivisions and no other reference than those of said survey shall be required and the boundaries of a claim so located and described need not be staked or monumented. The description by legal subdivisions shall be deemed the equivalent of marking.

§ 1426d. Within thirty days after the posting of the notice of location of a placer claim, the locator shall record a true copy thereof in the office of the county recorder of the county in which such claim is situated, for which service the recorder shall receive a fee of one dollar.

§ 1426e. The locator of a tunnel right or location, shall locate his tunnel right or location by posting a notice of location at the face or point of commencement of the tunnel, which must contain:

First—The name of the locator or locators.

Second—The date of the location.

Third—The proposed course or direction of the tunnel.

Fourth—A description of the tunnel, with reference to some natural object or permanent monument as shall identify the claim or tunnel right.

§ 1426f. The boundary lines of the tunnel shall be established by stakes or monuments placed along the lines at an interval of not more than six hundred feet from the face or point of commencement of the tunnel to the terminus of three thousand feet therefrom.

§ 1426g. Within thirty days after the posting the notice of location of the tunnel right or location, the locator shall record a true copy thereof, in the office of the county recorder of the county in which such claim is situated, for which service the recorder shall receive a fee of one dollar.

§ 1426h. If at any time the locator of any mining claim heretofore or hereafter located, or his assigns, shall apprehend that his original location notice was defective, erroneous, or that the requirements of the law had not been complied with before filing; or in case the original notice was made prior to the passage of this act, and he shall be desirous of securing the benefit of this act, such locator, or his assigns, may file an additional notice, subject to the provisions of this act: *provided*, that such amended location notice does not interfere with the existing rights of others at the time of posting and filing such amended location notice, and no such amended location notice or the record thereof, shall preclude the claimant, or claimants from proving any such title as he or they may have held under previous locations.

§ 1426i. Where a locator, or his assigns, has the boundaries and corners of his claim established by a United States deputy mineral survey, or a licensed surveyor of this state, and his claim connected with the corner of the public or minor surveys of an established initial point, and incorporates into the record of the claim, the field notes of such survey, and attaches to and files with such location notice a certificate of the surveyor, setting forth: *first*, that said survey was actually made by him, giving the date thereof; *second*, the name of the claim surveyed and the location thereof; *third*, that the description incorporated in the declaratory statement is sufficient to identify: such survey and certificate becomes a part of the record, and such record is *prima facie* evidence of the facts therein contained.

§ 1426j. The proprietor of a vein or lode claim or mine, or the owner of a quartz mill or reduction works, or any person qualified by the laws of the United States, may locate not more than five acres of non-mineral land as a mill site. Such location shall be made in the same manner as hereinbefore required for locating placer claims.

§ 1426k. The locator of a mill site claim or location shall, within thirty days from the date of his location, record a true copy of his location notice with the county recorder of the county in which such location is situated, for which service the recorder shall receive a fee of one dollar.

§ 1426l. The amount of work done or improvements made during each year to hold possession of a mining claim shall be that prescribed by the laws of the United States, to wit: One hundred dollars annually.

§ 1426m. Whenever [a] mine owner, company, or corporation shall have performed the labor and made the improvements required by law upon any mining claim, the person in whose behalf such labor was performed or improvements made, or some one in his behalf, shall within thirty days after the time limited for performing such labor or making such improvements make and have recorded by the county recorder, in books kept for that purpose, in the county in which such mining claim is situated, an affidavit setting forth the value of labor or improvements made, the name of the claim, and the name of the owner or claimant of said claim at whose expense the same was made or performed. Such affidavit, or a copy thereof, duly certified by the county recorder, shall be prima facie evidence of the performance of such labor or the making of such improvements, or both.

§ 1426n. For recording the affidavit herein required, the county recorder shall receive a fee of fifty cents.

§ 1426o. Whenever a co-owner or co-owners of a mining claim shall give to a delinquent co-owner or co-owners the notice in writing or notice by publication provided for in section 2324, Revised Statutes of the United States, an affidavit of the person giving such notice, stating the time, place, manner of service, and by whom and upon whom such service was made, shall be attached to a true copy of such notice, and such notice and affidavit must be recorded in the office of the county recorder, in books kept for that purpose, in the county in which the claim is situated, within ninety days, after the giving of such notice; for the recording of which said recorder shall receive the same fees as are now allowed by law for recording deeds; or if such notice is given by publication in a newspaper, there shall be attached to a printed copy of such notice an affidavit of the printer or his foreman, or principal clerk of such paper, stating the date of the first, last and each insertion of such notice therein, and where the newspaper was published during that time, and the name of such newspaper. Such affidavit and notice shall be recorded as aforesaid, within one hundred and eighty days after the first publication thereof. The original of such notice and affidavit, or a duly certified copy of the record thereof, shall be prima facie evidence that the delinquent mentioned in section 2324 has failed or refused to contribute his proportion of the expenditure required by that section, and of the service of publication of said notice; *provided*, the writing or affidavit hereinafter provided for is not of record. If such delinquent shall, within the ninety days required by section 2324, aforesaid, contribute to his co-owner or co-owners, his proportion of such expenditures, and also all costs of service of the notice required by this section, whether incurred for publication charges, or otherwise, such co-owner or co-owners shall sign and deliver to the delinquent or delinquents a writing stating that the delinquent or delinquents by name has within the time required by section 2324 aforesaid, contributed his share for the year _____, upon the _____ mine, and further stating therein the district, county and state wherein the same is situated, and the book and page where the location notice is recorded, if said mine was located under the provisions of this act; such writing shall be recorded in the office of the county recorder of said county, for which he shall receive the same fees as are now allowed by law for recording deeds. If such co-owner or co-owners shall fail to sign and deliver such writing to the delinquent or delinquents within twenty days after such contribution, the co-owner or co-owners so failing as aforesaid shall be liable to the penalty of one hundred dollars, to be recovered by any person for the use of the delinquent or delinquents in any court of competent jurisdiction. If

such co-owner or co-owners fail to deliver such writing within said twenty days, the delinquent, with two disinterested persons having personal knowledge of such contribution, may make affidavit setting forth in what manner, the amount of, to whom, and upon what mine, such contribution was made. Such affidavit, or a record thereof, in the office of the county recorder of the county in which such mine is situated, shall be prima facie evidence of such contribution.

§ 1426*p*. The record of any location of a mining claim, mill site or tunnel right, in the office of the county recorder, as herein provided shall be received in evidence, and have the same force and effect in the courts of the state as the original notice.

§ 1426*q*. Copies of the records of all instruments required to be recorded by the provisions of this act, duly certified by the recorder, in whose custody such records are, may be read in evidence, under the same circumstances and rules as are now, or may be hereafter provided by law, for using copies of instruments relating to real estate, duly executed or acknowledged or proved and recorded.

§ 1426*r*. The provisions of this act shall not in any manner be construed as affecting or abolishing any mining district or the rules and regulations thereof within the State of California.

§ 1426*s*. The failure or neglect of any locator of a mining claim to perform development work of the character, in the manner and within the time required by the laws of the United States, shall disqualify such locators from relocating the ground embraced in the original location or mining claim or any part thereof under the mining laws, within three years after the date of his original location and any attempted relocation thereof by any of the original locators shall render such location void.

SEC. 2. All acts and parts of acts in conflict with this act, are hereby repealed.

SEC. 3. This act shall take effect and be in force on and after July 1, 1909.

LARCENY OF GOLD-DUST AND AMALGAM.

An act supplementary to an act entitled "An act concerning crimes and punishments," passed April 16, 1850.

[Approved March 20, 1872; 1871-2, 435.]

SECTION 1. Every person who shall feloniously steal, take and carry away, or attempt to take, steal, and carry from any mining claim, tunnel, sluice, under-currant, riffle-box, or sulphurate (sulphuret) machine any gold-dust, amalgam, or quick-silver, the property of another, shall be deemed guilty of grand larceny, and upon conviction thereof shall be punished by imprisonment in the state prison for any term of not less than one year nor more than fourteen years.

SEC. 2. This act shall be in force from and after its passage.

CALIFORNIA MINE BELL SIGNALS.

An act to establish a uniform system of mine bell signals, to be used in all the mines operated in the State of California, and for the protection of miners.

[Approved March 8, 1893.]

SECTION 1. Every person, company, corporation, or individual, operating any mine within the State of California—gold, silver, copper, lead, coal, or any other metal or substance—where it is necessary to use signals by means of bell or otherwise, for shafts, inclines, drifts, crosscuts, tunnels, and underground workings, shall, after the passage of this bill, adopt, use, and put in force the following system or code of mine bell signals, as follows:

- 1 bell, to hoist. (See Rule 2.)
- 1 bell, to stop if in motion.
- 2 bells to lower. (See Rule 2.)
- 3 bells, man to be hoisted; run slow. (See Rule 2.)
- 4 bells, start pump if not running, or stop pump if running.

1—3 bells, start or stop air compressor.

5 bells, send down tools. (See Rule 4.)

6 bells, send down timbers. (See Rule 4.)

7 bells, accident; move bucket or cage by verbal orders only.

1—4 bells, foreman wanted.

2—1—1 bells, done hoisting until called.

2—1—2 bells, done hoisting for the day.

2—2—2 bells, change buckets from ore to water, or vice versa.

3—2—1 bells, ready to shoot in the shaft. (See Rule 3.)

Engineer's signal, that he is ready to hoist, is to raise the bucket or cage two feet and lower it again. (See Rule 3.)

Levels shall be designated and inserted in notice hereinafter mentioned. (See Rule 5.)

SEC. 2. For the purpose of enforcing and properly understanding the above code of signals, the following rules are hereby established:

Rule 1—In giving signals make strokes on bell at regular intervals. The bar (—) must take the same time as for one stroke of the bell, and no more. If timber, tools, the foreman, bucket or cage are wanted to stop at any level in the mine, signal by number of strokes on the bell, number of the level first before giving the signal for timber, tools, etc. Time between signals to be double bars (— —). Example:

6—5 would mean stop at sixth level with tools.

4—1—1—1—1, would mean to stop at fourth level, man on, hoist.

2—1—4 would mean stop at second level with foreman.

Rule 2—No person must get off or on the bucket or cage, while the same is in motion. When men are to be hoisted give the signal for men. Men *must* then get on bucket or cage, *then* give the signal to hoist. Bell cord must be in reach of man on the bucket or cage at stations.

Rule 3—After signal "Ready to shoot in shaft," engineer must give his signal when he is ready to hoist. Miners must then give the signal of "Men to be hoisted," then "spit fuse," get into the bucket, and give the signal to hoist.

Rule 4—All timbers, tools, etc., "longer than the depth of the bucket," to be hoisted or lowered, must be securely lashed at the upper end to the cable. Miners must know they will ride up or down the shaft without catching on rocks or timbers and be thrown out.

Rule 5—The foreman will see that one printed sheet of these signals and rules for each level and one for the engine-room are attached to a board not less than twelve inches wide by thirty-six inches long, and securely fasten the board up where signals can be easily read at the places above stated.

Rule 6—The above signals and rules must be obeyed. Any violation will be sufficient grounds for discharging the party or parties so doing. No person, company, corporation, or individuals operating any mine within the State of California, shall be responsible for accidents that may happen to men disobeying the above rules and signals. Said notice and rules shall be signed by the person or superintendent having charge of the mine, who shall designate the name of the corporation or the owner of the mine.

SEC. 3. Any person or company failing to carry out any of the provisions of this act shall be responsible for all damages arising to or incurred by any person working in said mine during the time of such failure.

SEC. 4. This act shall take effect immediately.

MINER'S INCH DEFINED.

An act fixing and defining a miner's inch of water.

[Approved March 23, 1901.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. The standard miner's inch of water shall be equivalent or equal to one and one half cubic feet of water per minute, measured through any aperture or orifice.

SEC. 2. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

SEC. 3. This act shall be in effect and force sixty days from and after its passage.

FORMS FOR LOCATION NOTICES.

The following forms for mineral location notices have been found to fill the requirements of the statutes:

NOTICE OF QUARTZ LODE LOCATION.

Notice is hereby given, That I, _____, a citizen of the United States, have discovered a vein of rock in place, carrying gold, silver, copper, and other valuable deposits, upon which I have erected a discovery monument and posted this notice, as hereinafter set forth; that in accordance with the provision of Chapter 6, Title 32 of the Revised Statutes of the United States and the laws of the State of California, I hereby claim fifteen hundred linear feet of said vein, measured thereon as hereinafter set forth. Said discovery was made on the _____ day of _____, 19____. Immediately upon making the same, and on the _____ day of _____, 19____, I erected at the point of discovery, a substantial monument, consisting of a mound of rocks and _____, and posted thereon this notice.

The * general course of said vein is _____ and _____. I claim in length thereon _____ feet _____ and _____ feet _____ from said discovery monument. I also claim three hundred feet on each side of the center of the vein. This vein or claim shall be known as and called the _____. It is situated in _____ Mining District, and in § Sec. _____, Tp. _____, R. _____, B. and M., in _____ County, California, and the discovery monument _____ being placed about §

from _____

That the following is a description of said location as marked on the ground: ‡ commencing at the _____ of said claim, a _____ from which initial point the discovery monument is distant about _____ feet in a _____ direction; _____ thence || _____

Dated and posted on the ground, this _____ day of _____, 19____.

Witness _____

Locator.

*Make this description in accordance with the facts, as "The general course of said vein is north and south. I claim in length thereon 500 feet north and 1,000 feet south from said discovery monument."

‡If the claim is upon surveyed land, give the section, township and range, if possible. This is not required by law, but makes a much better description.

§Here refer to some natural object or permanent monument so as to identify the locality of the claim, in compliance with section 2324, Revised Statutes U. S. A road, house, tree, known mountain or peak, government corner, mill, or known mining claim, are such objects or monuments. As, "About one mile directly east from John Doe's quartz mill and 400 rods west from the Last Hope mine," etc.

‡Here state: "Commencing at the N. E. corner of said claim, a mound of rocks 4 ft. high," or at any other corner or point in the boundary; give the distance and direction from this initial monument to the discovery monument, and then locate the discovery with reference to some natural object or permanent monument.

||Here follows a description of the claim from the initial monument. For instance: "Thence 600 ft. northwesterly to the N. W. corner of said claim, at which point is a mound of rocks 2½ ft. high, marked so-and-so, (if marked); thence 1,500 ft. southwesterly to the S. W. corner of said claim, being a mound of rocks," etc.; so going around the claim to the point of beginning.

NOTICE OF LOCATION OF PLACER CLAIM.

Notice is hereby given. That _____ day of _____ citizen _____ of the United States, h_____ this _____ day of _____, 19____, discovered a valuable placer deposit within the limits of this claim; that by virtue of said discovery, _____ ha_____ located, and hereby locate and claim the following described land, situate in _____ Mining District, _____ County, California, to wit: * _____ of section _____ Township _____, Range _____, B. and M., containing _____ acres.† Said claim is hereby named _____ Placer Claim. Said claim is marked upon the ground as follows: ‡ _____

This notice is posted on a mound of rocks at the point of discovery, situated § _____

Dated and posted on the ground, this _____ day of _____, 19____.

Locator.

*The statute provides that the locator must give "a description of the claim by reference to legal subdivisions of sections, if the location is made in conformity with the public surveys; otherwise a description with reference to some natural object or permanent monument as will identify the claim."

†When not described by legal subdivisions, the description should conform to that contained in the final certificate of location of a lode claim.

‡The statute provides that, whether described by legal subdivisions or not, the location shall be marked by the locator on the ground, and as the affidavit to be filed later is not required to contain a description of the claim, we think this notice should state how the location is marked; as for instance, "At the N. E. corner of said tract a mound of rocks 3 ft. high, marked so-and-so (if marked), and at the N. W. corner a stake in a mound of rocks, marked," etc., and so on for each monument enclosing the claim.

§Here state where the discovery is located, as, for instance, "20 ft. S. W. of the N. E. corner monument."

A duplicate of this notice must be filed for record with the county recorder within thirty days from the discovery; and the locator is allowed thirty days to mark his location on the ground.

The foregoing form of placer notice may be used for location of all deposits which are classed under placer laws.

APPENDIX.

PUBLICATIONS OF THE CALIFORNIA STATE MINING BUREAU.

Publications of this Bureau will be sent on receipt of the requisite amount. Only stamps, coin or money orders will be accepted in payment.

Money orders should be made payable to the STATE MINING BUREAU.

Personal checks will not be accepted.

REPORTS.

Asterisk (*) indicates the publication is out of print.

*Report	I.	Henry G. Hanks.	1880.		
*Report	II.	Henry G. Hanks.	1882.		
*Report	III.	Henry G. Hanks.	1883.		
*Report	IV.	Henry G. Hanks.	1884.		
*Report	V.	Henry G. Hanks.	1885.		
*Report	VI—Part 1.	Henry G. Hanks.	1886.		
*Report	VI—Part 2.	Wm. Irelan, Jr.	1886.		
*Report	VII.	Wm. Irelan, Jr.	1887.		
*Report	VIII.	Wm. Irelan, Jr.	1888.		
*Report	IX.	Wm. Irelan, Jr.	1889.		
*Report	X.	Wm. Irelan, Jr.	1890.		
Report	XI.	Wm. Irelan, Jr.	1892. (First biennial.)	-----	Price. \$1.00
*Report	XII.	J. J. Crawford.	1894. (Second biennial.)	-----	-----
*Report	XIII.	J. J. Crawford.	1896. (Third biennial.)	-----	-----

BULLETINS.

*Bulletin	1.	Desiccated Human Remains.—Winslow Anderson.	1888	-----	Price.
*Bulletin	2.	Methods of Mine Timbering.—W. H. Storms.	1894	-----	-----
*Bulletin	3.	Gas and Petroleum Yielding Formations of the Central Valley of California.—W. L. Watts.	1894	-----	-----
*Bulletin	4.	Catalogue of California Fossils (Parts 2, 3, 4 and 5).—J. G. Cooper.	1894	-----	-----
*Bulletin	5.	The Cyanide Process: Its Practical Application and Economical Results.—A. Scheidel.	1894	-----	-----
Bulletin	6.	California Gold Mill Practices.—E. B. Preston.	1895	-----	\$.50
*Bulletin	7.	Mineral Production of California, by Counties, 1894.—Chas. G. Yale. (Tabulated sheet)		-----	-----
*Bulletin	8.	Mineral Production of California, by Counties, 1895.—Chas. G. Yale. (Tabulated sheet)		-----	-----
Bulletin	9.	Mine Drainage, Pumps, etc.—Hans C. Behr.	1896	-----	.60
*Bulletin	10.	A Bibliography Relating to the Geology, Paleontology, and Mineral Resources of California.—A. W. Vodge.	1896	-----	-----
*Bulletin	11.	Oil and Gas Yielding Formations of Los Angeles, Ventura, and Santa Barbara Counties.—W. L. Watts.	1896	-----	-----
*Bulletin	12.	Mineral Production of California, by Counties, 1896.—Chas. G. Yale. (Tabulated sheet)		-----	-----
*Bulletin	13.	Mineral Production of California, by Counties, 1897.—Chas. G. Yale. (Tabulated sheet)		-----	-----
*Bulletin	14.	Mineral Production of California, by Counties, 1898.—Chas. G. Yale. (Tabulated sheet)		-----	-----
Bulletin	15.	Map of Oil City Oil Fields, Fresno County.—J. H. Means.		-----	-----
*Bulletin	16.	The Genesis of Petroleum and Asphaltum in California.—A. S. Cooper.	1899	-----	-----
*Bulletin	17.	Mineral Production of California, by Counties, 1899.—Chas. G. Yale. (Tabulated sheet)		-----	-----
*Bulletin	18.	The Mother Lode Region of California.—W. H. Storms.	1900	-----	-----
*Bulletin	19.	Oil and Gas Yielding Formations of California.—W. L. Watts.	1900	-----	-----
*Bulletin	20.	Synopsis of Reports of State Mining Bureau.—W. L. Watts.	1900	-----	-----
*Bulletin	21.	Mineral Production of California, by Counties, 1900.—Chas. G. Yale. (Tabulated sheet)		-----	-----
*Bulletin	22.	Mineral Production of California for Fourteen Years.—Chas. G. Yale. (Tabulated sheet)		-----	-----
Bulletin		Reconnaissance of the Colorado Desert Mining District.—Stephen Bowers.	1901	-----	-----
Bulletin	23.	The Copper Resources of California.—P. C. DuBois, F. M. Anderson, J. H. Tibbits, and G. A. Tweedy.	1902	-----	.50
*Bulletin	24.	The Saline Deposits of California.—G. E. Bailey.	1902	-----	-----
*Bulletin	25.	Mineral Production of California, by Counties, 1901.—Chas. G. Yale. (Tabulated sheet)		-----	-----

PUBLICATIONS OF THE CALIFORNIA STATE MINING BUREAU—Continued.

Asterisk (*) indicates the publication is out of print.

	Price.
*Bulletin 26. Mineral Production of California for Fifteen Years.—Chas. G. Yale. 1901. (Tabulated sheet) -----	
Bulletin 27. The Quicksilver Resources of California.—Wm. Forstner. 1903.-----	\$.75
*Bulletin 28. Mineral Production of California, by Counties, 1902.—Chas. G. Yale. (Tabu- lated sheet) -----	
*Bulletin 29. Mineral Production of California for Sixteen Years.—Chas. G. Yale. 1902. (Tabulated sheet) -----	
*Bulletin 30. A Bibliography of Geology, Paleontology, and Mineral Resources of Cali- fornia.—A. W. Vodges. 1903.-----	
Bulletin 31. Chemical Analyses of California Petroleum.—H. N. Cooper. 1903. (Tabu- lated sheet) -----	
Bulletin 32. Production and Use of Petroleum in California.—P. W. Prutzman. 1904.-----	.25
*Bulletin 33. Mineral Production of California, by Counties, 1903.—Chas. G. Yale. (Tabu- lated sheet) -----	
*Bulletin 34. Mineral Production of California for Seventeen Years.—Chas. G. Yale. 1903. (Tabulated sheet) -----	
*Bulletin 35. Mines and Minerals of California for 1903.—Chas. G. Yale. 1904. (Statist- tical) -----	
*Bulletin 36. Gold Dredging in California.—J. E. Doolittle. 1905.-----	
Bulletin 37. Gems, Jewelers' Materials, and Ornamental Stones of California.—George F. Kunz. 1905:	
First edition (without colored plates)-----	.25
Second edition (with colored plates)-----	.50
*Bulletin 38. The Structural and Industrial Materials of California.—Wm. Forstner, T. C. Hopkins, C. Naramore, L. H. Eddy. 1906.-----	
*Bulletin 39. Mineral Production of California, by Counties, 1904.—Chas. G. Yale. (Tabu- lated sheet) -----	
*Bulletin 40. Mineral Production of California for Eighteen Years.—Chas. G. Yale. 1904. (Tabulated sheet) -----	
*Bulletin 41. Mines and Minerals of California for 1904.—Chas. G. Yale. (Statistical)-----	
*Bulletin 42. Mineral Production of California, by Counties, 1905.—Chas. G. Yale. (Tabu- lated sheet) -----	
*Bulletin 43. Mineral Production of California for Nineteen Years.—Chas. G. Yale. 1905. (Tabulated sheet) -----	
*Bulletin 44. Mines and Minerals of California for 1905.—Chas. G. Yale. (Statistical)-----	
*Bulletin 45. Auriferous Black Sands of California.—J. A. Edman. 1907.-----	
Bulletin 46. General Index to Publications of the State Mining Bureau.—Compiled by Chas. G. Yale. 1907.-----	.30
*Bulletin 47. Mineral Production of California, by Counties, 1906.—Chas. G. Yale. (Tabu- lated sheet) -----	
*Bulletin 48. Mineral Production of California for Twenty Years.—Chas. G. Yale. 1906. (Tabulated sheet) -----	
*Bulletin 49. Mines and Minerals of California for 1906.—Chas. G. Yale. (Statistical)-----	
Bulletin 50. The Copper Resources of California.—A. Hausmann, J. Kruttschnitt, Jr., W. E. Thorne, J. A. Edman. 1908.-----	1.00
*Bulletin 51. Mineral Production of California, by Counties, 1907.—D. H. Walker, Statis- tician. (Tabulated sheet)-----	
*Bulletin 52. Mineral Production of California for Twenty-one Years.—D. H. Walker, Statistician. 1907. (Tabulated sheet)-----	
*Bulletin 53. Mineral Productions of California for 1907, with County Maps.—D. H. Walker, Statistician. 1908. (Statistical)-----	
*Bulletin 54. Mineral Production of California, by Counties, 1908.—D. H. Walker, Statis- tician. (Tabulated sheet)-----	
*Bulletin 55. Mineral Production of California for Twenty-two Years.—D. H. Walker, Statistician. 1908. (Tabulated sheet)-----	
*Bulletin 56. Mineral Productions for 1908, County Maps, and Mining Laws of California.— D. H. Walker. 1909. (Statistical)-----	
Bulletin 57. Gold Dredging in California.—W. B. Winston, Charles Janin. 1910.-----	1.50
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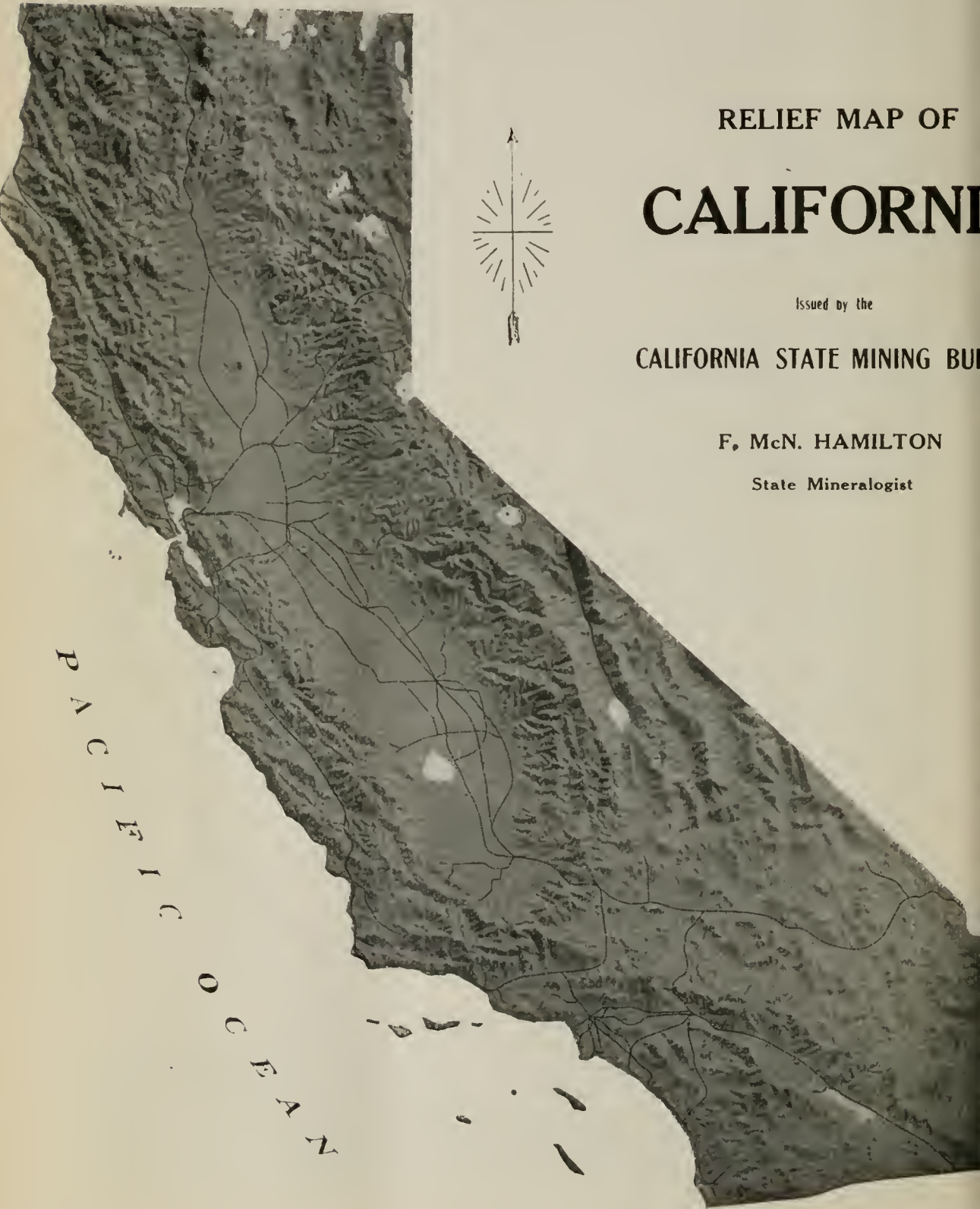
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The following county maps show all towns, postoffices, railroads and stage lines and distances between points. They are especially valuable to all who wish to leave the railroad and penetrate to the interior of the mining districts of the State. These maps must not be reproduced without obtaining permission from the Mining Bureau.



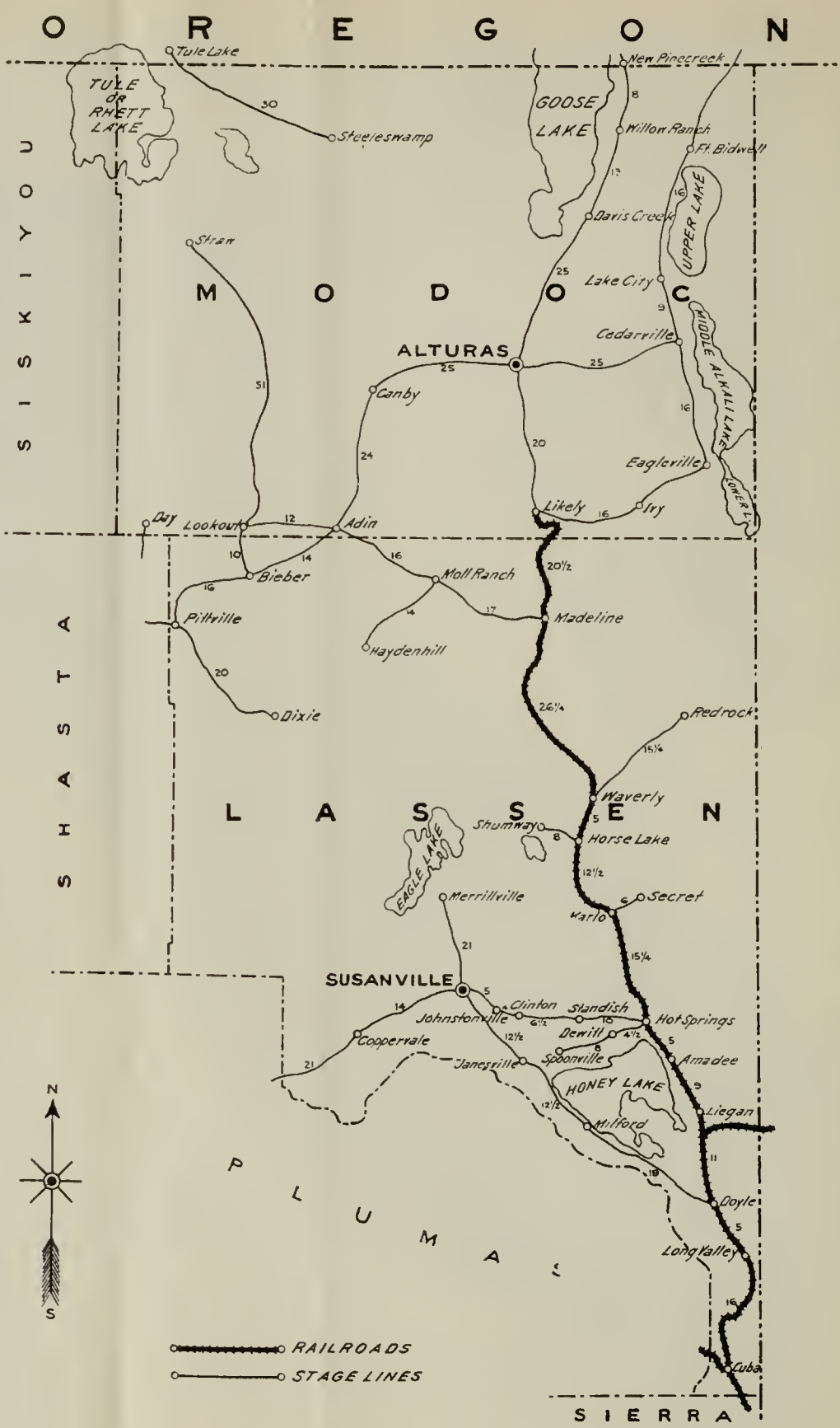
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State Mineralogist



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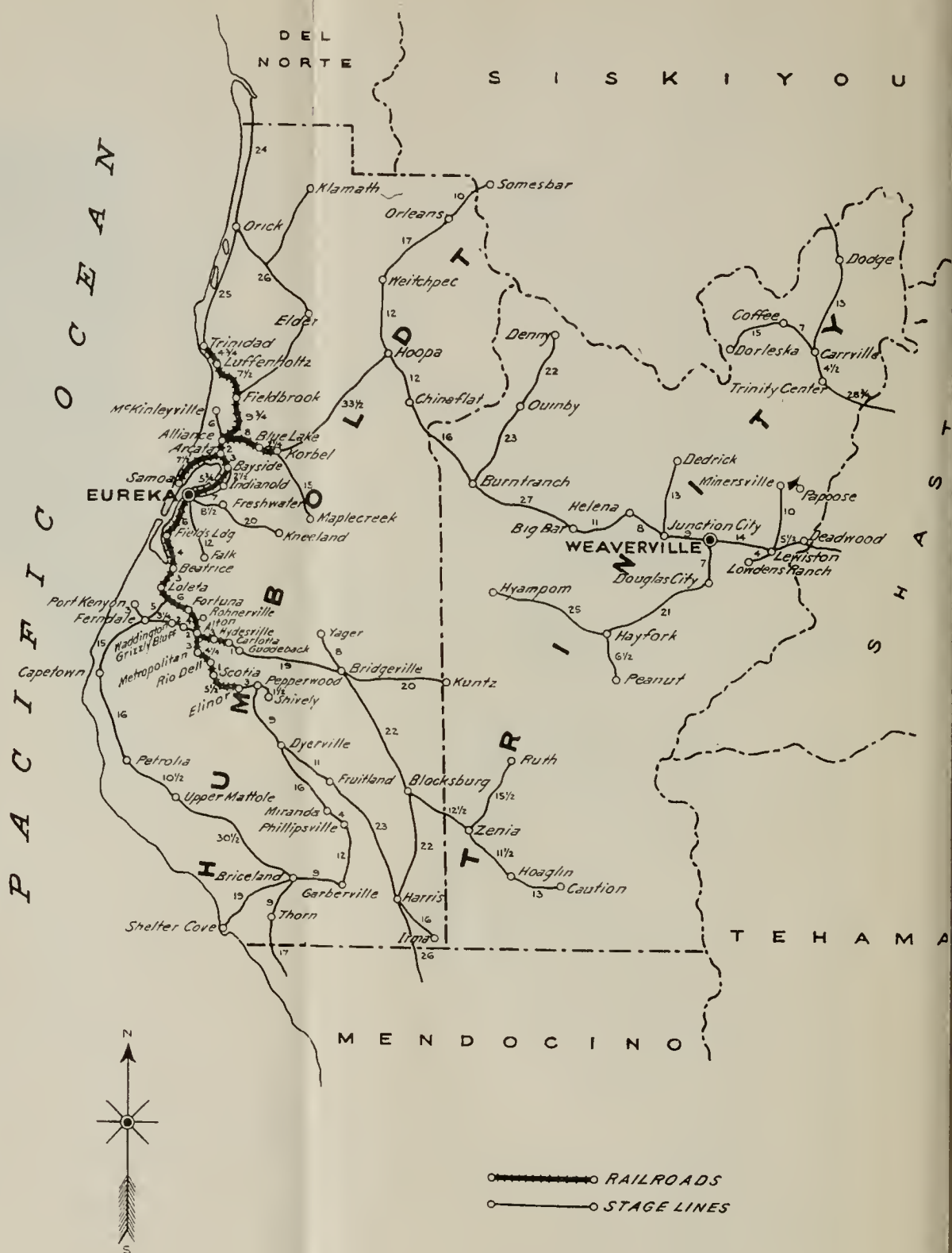
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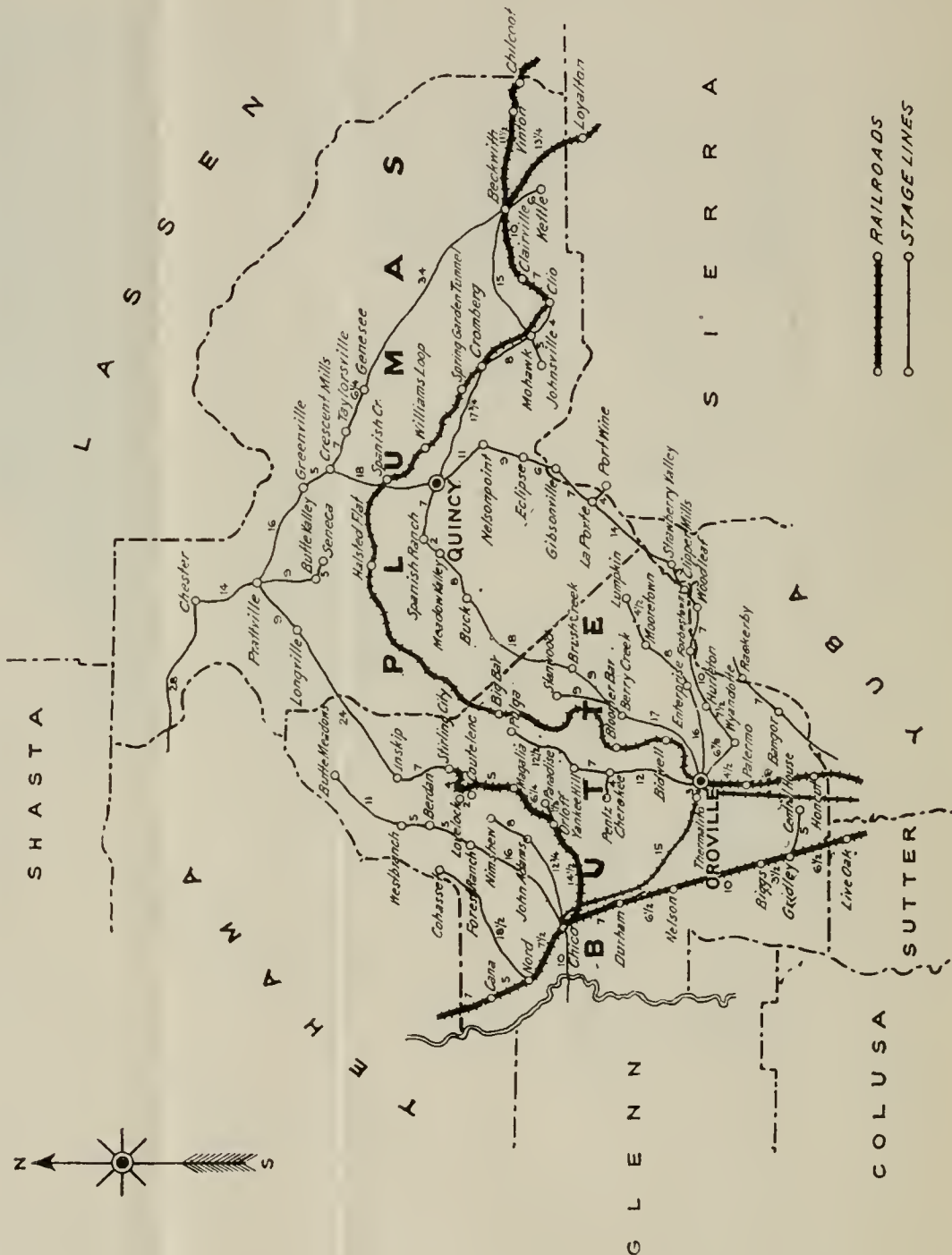


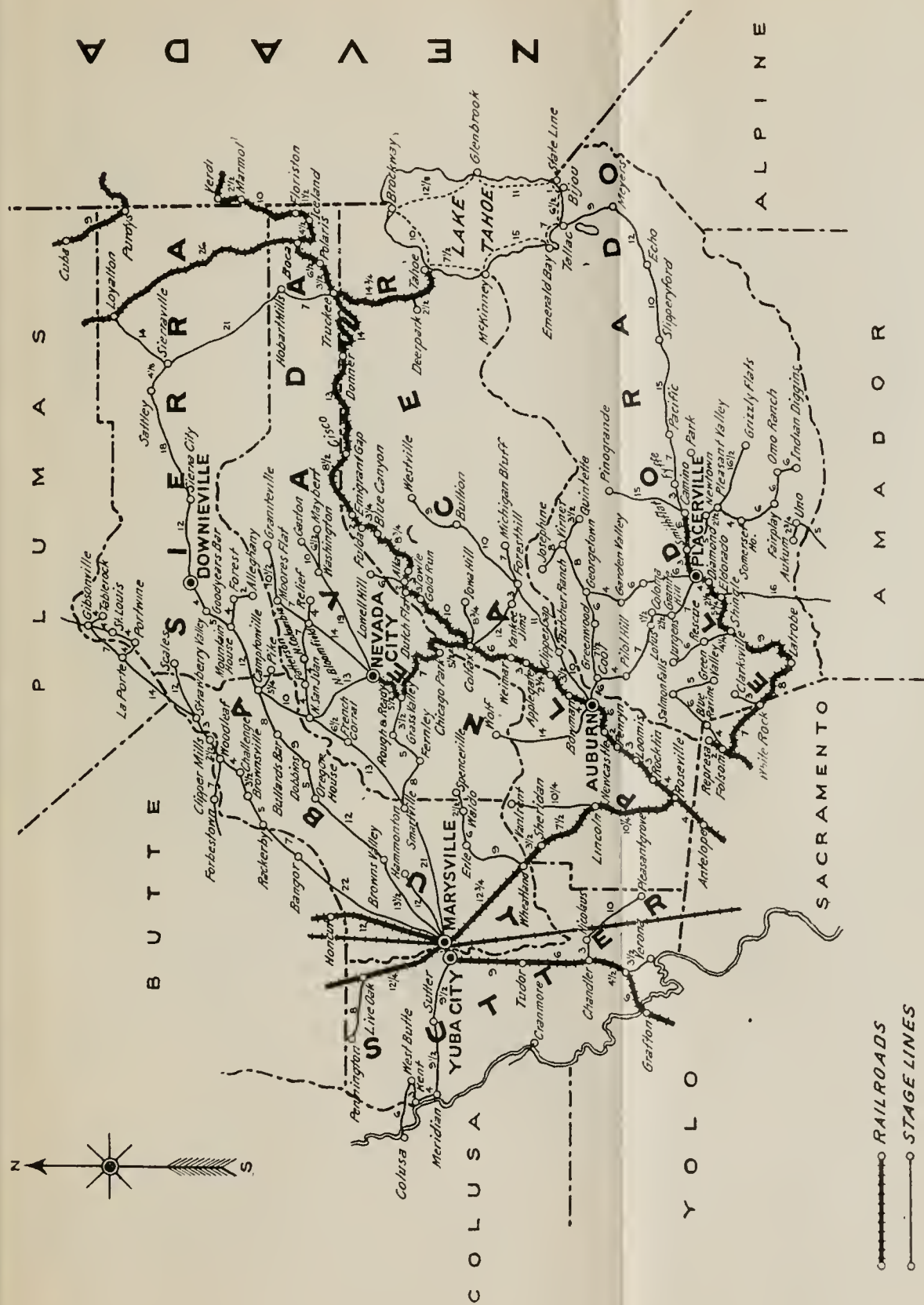
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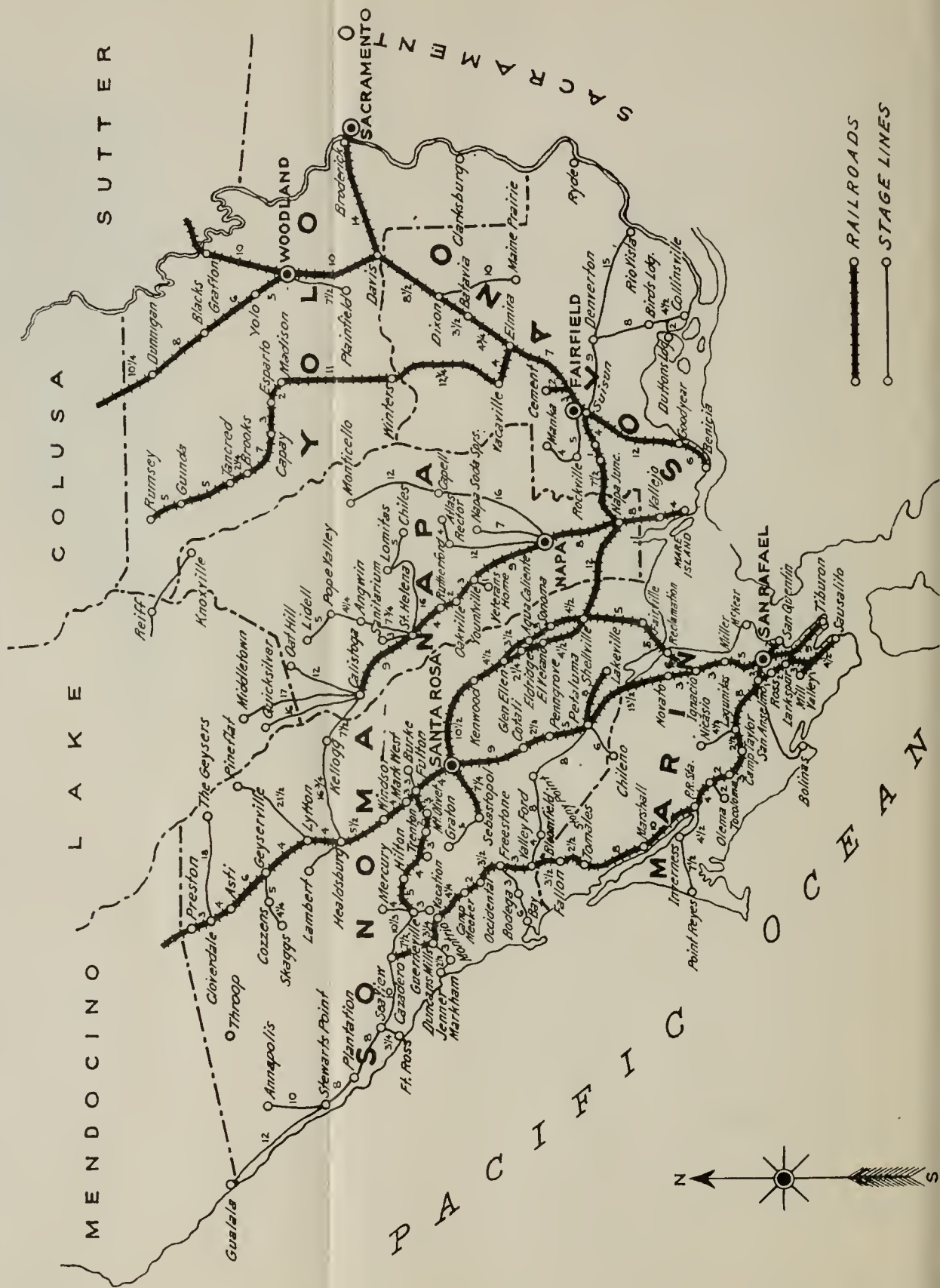


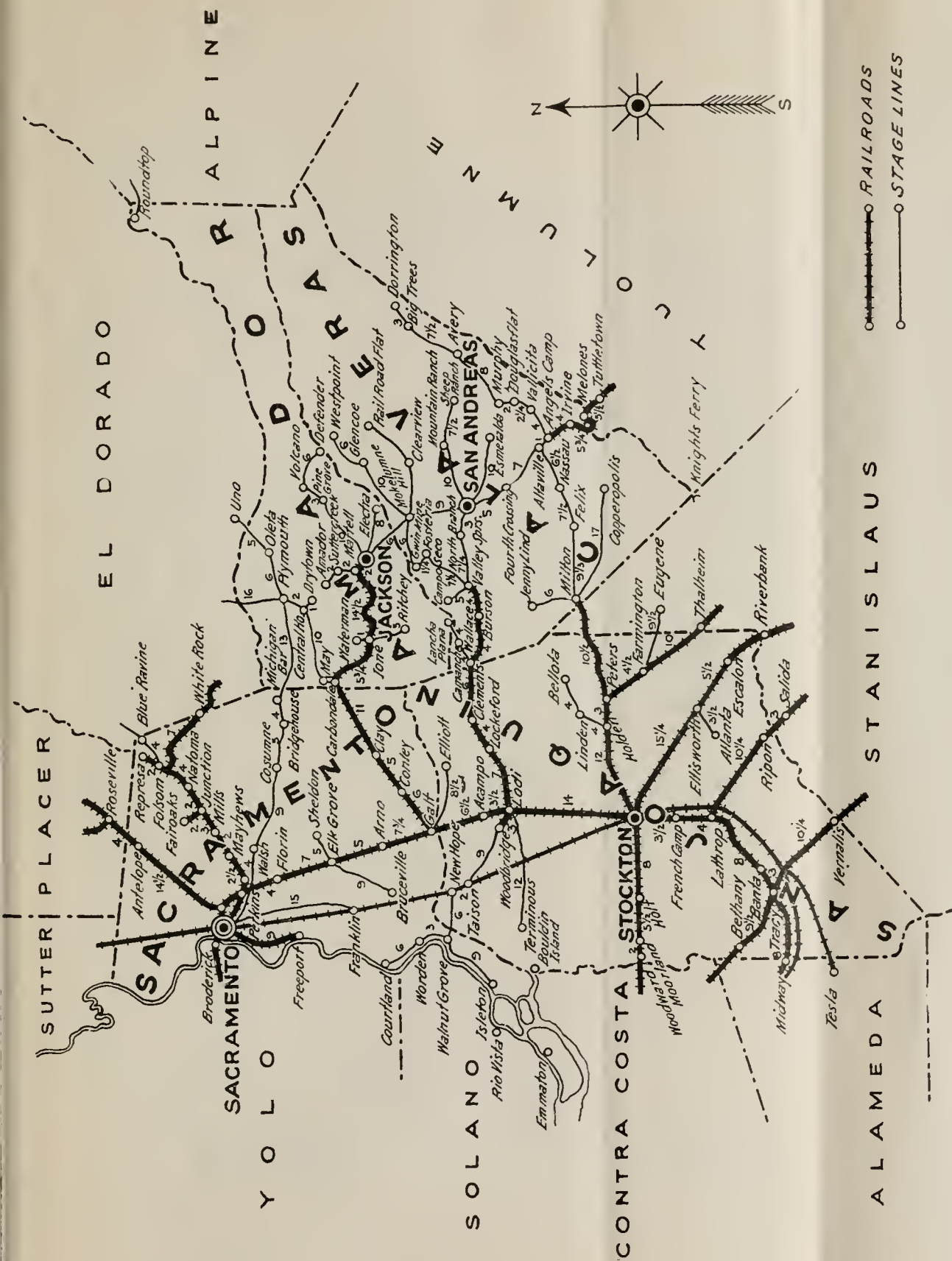
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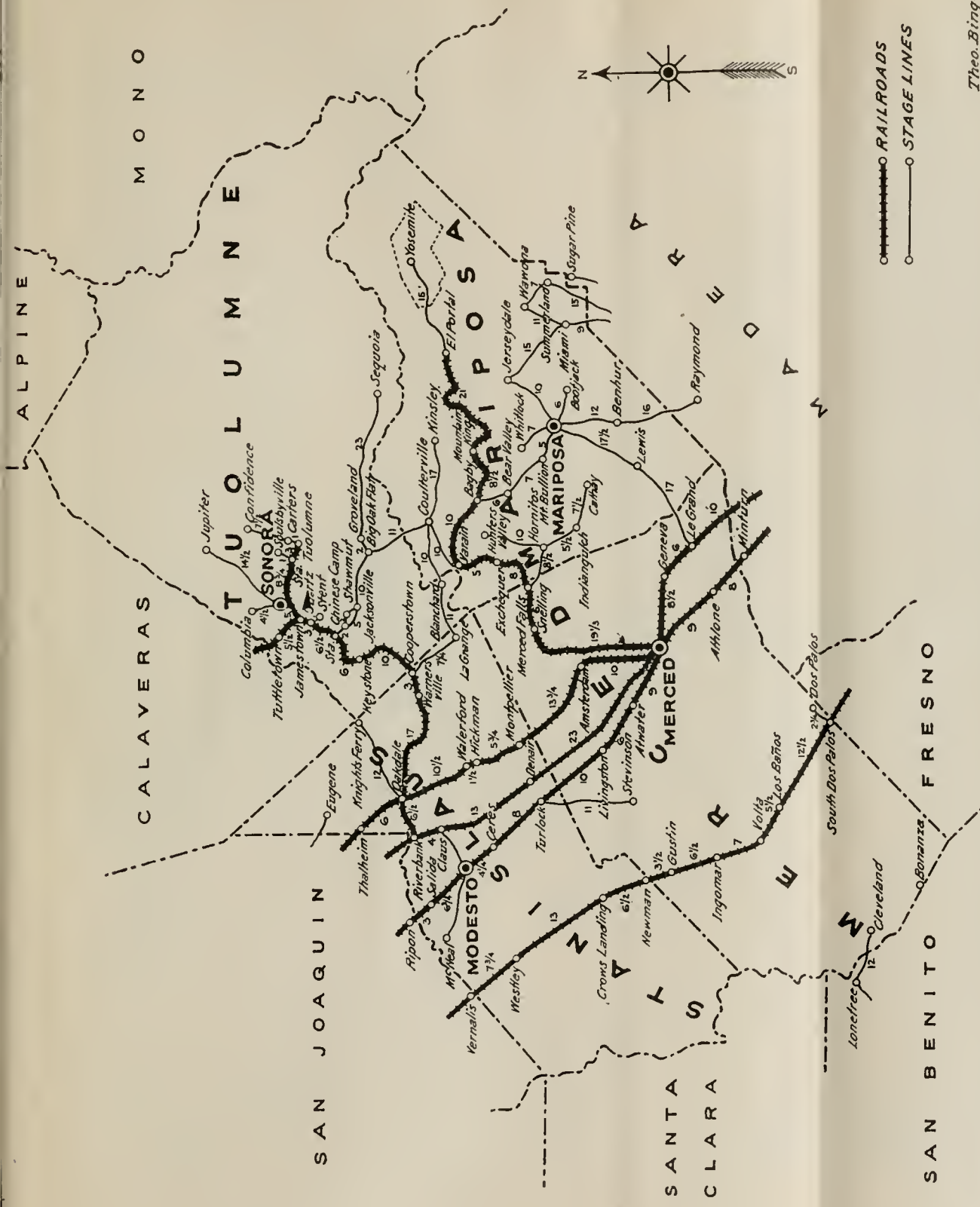
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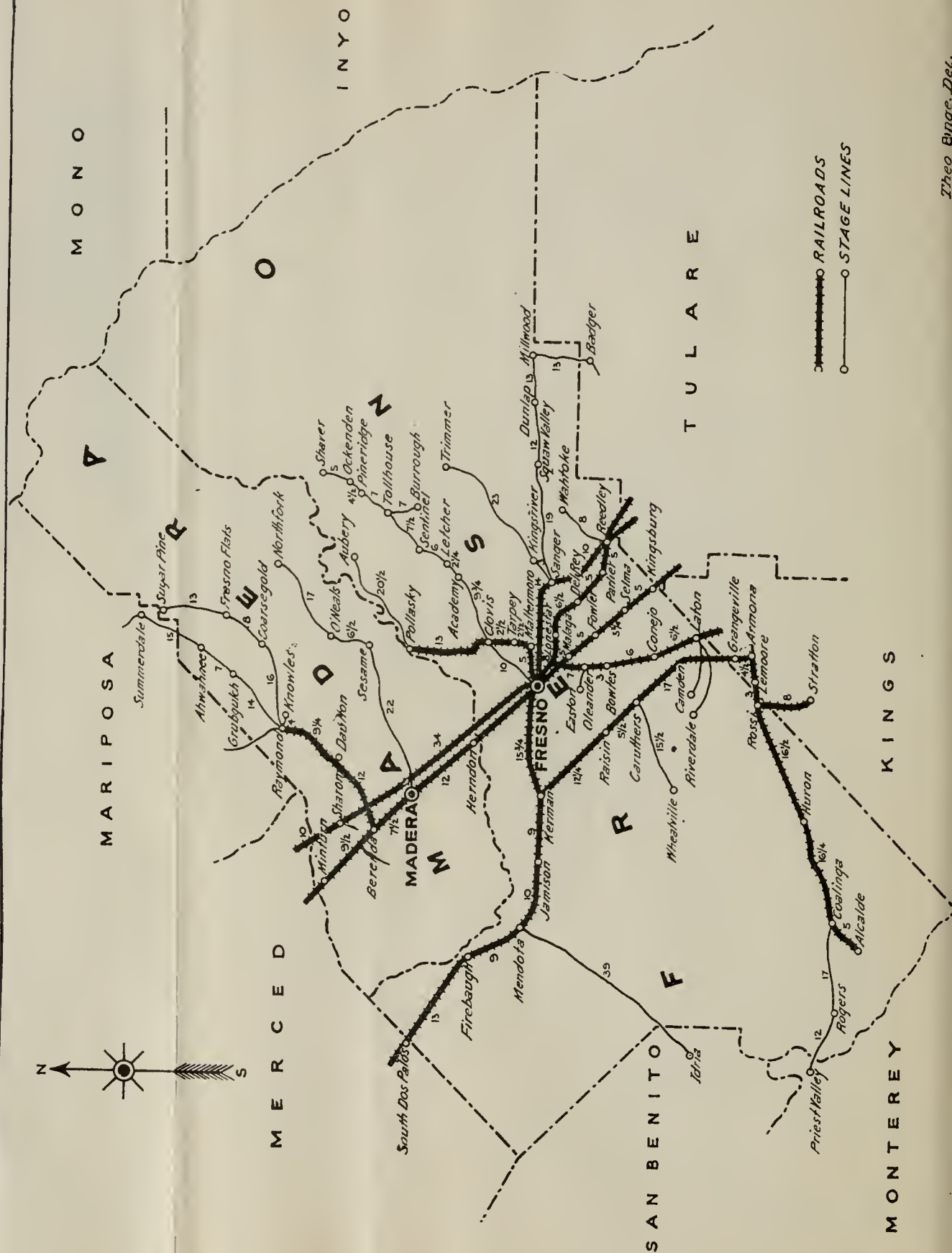


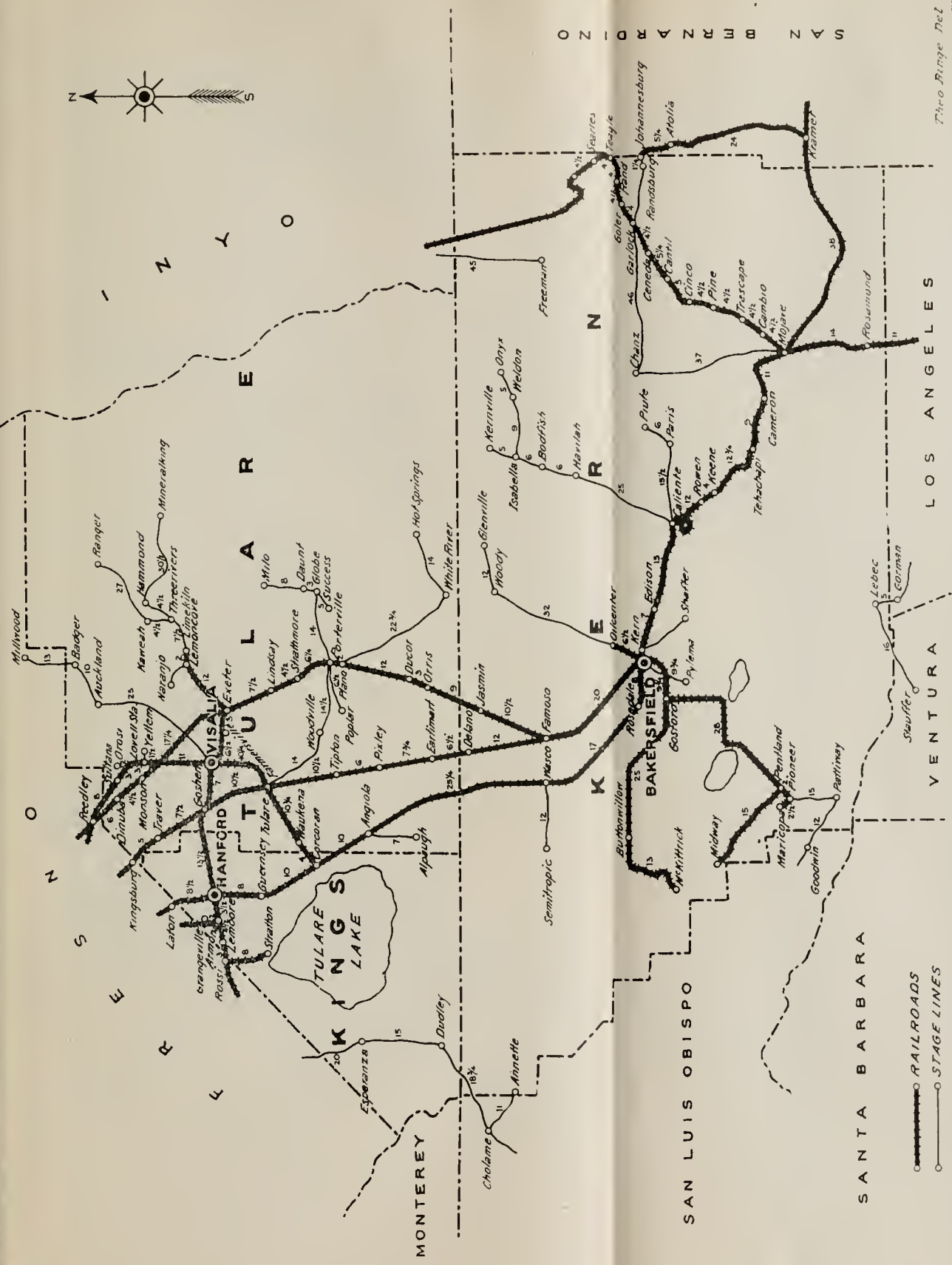
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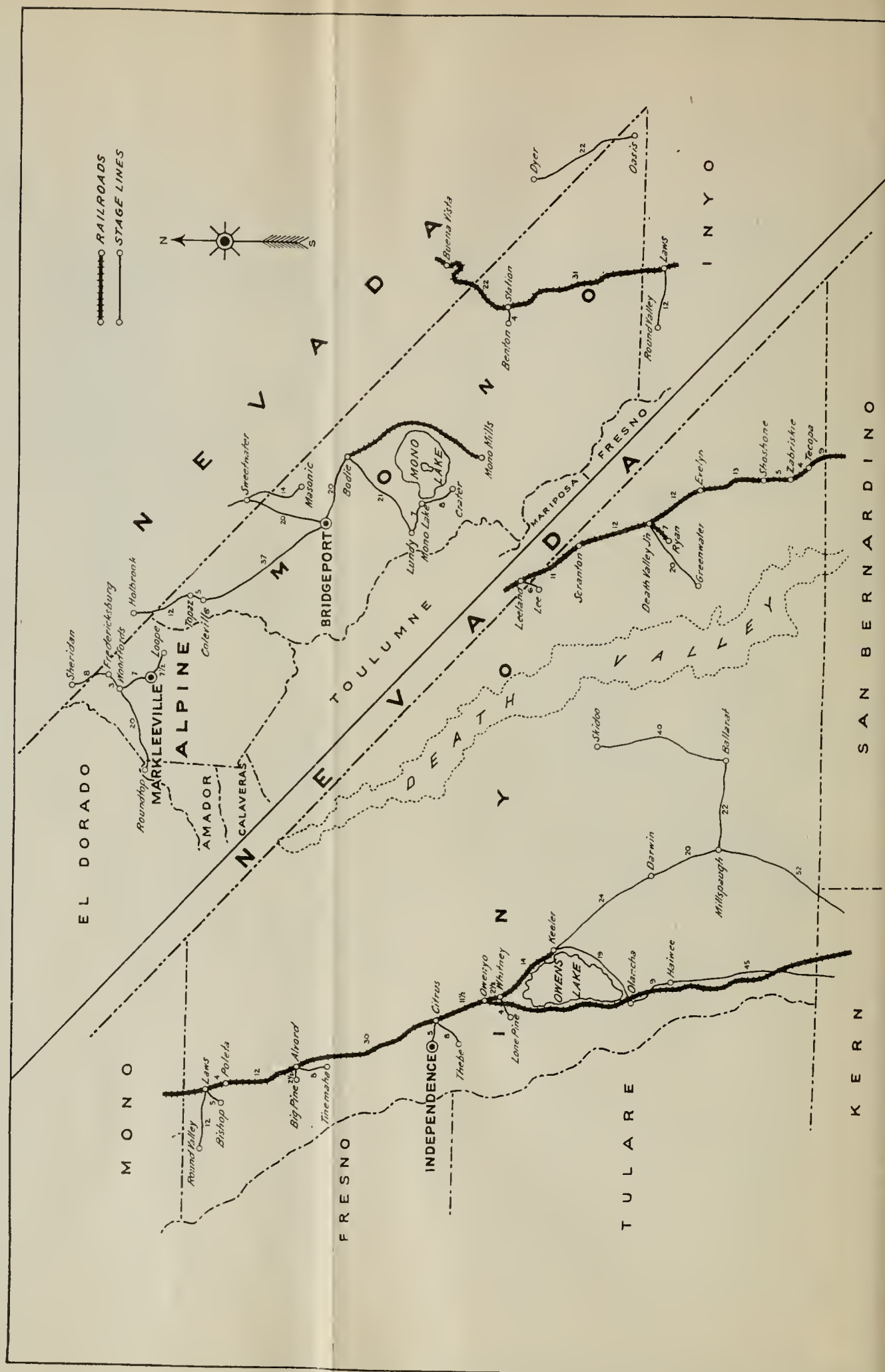
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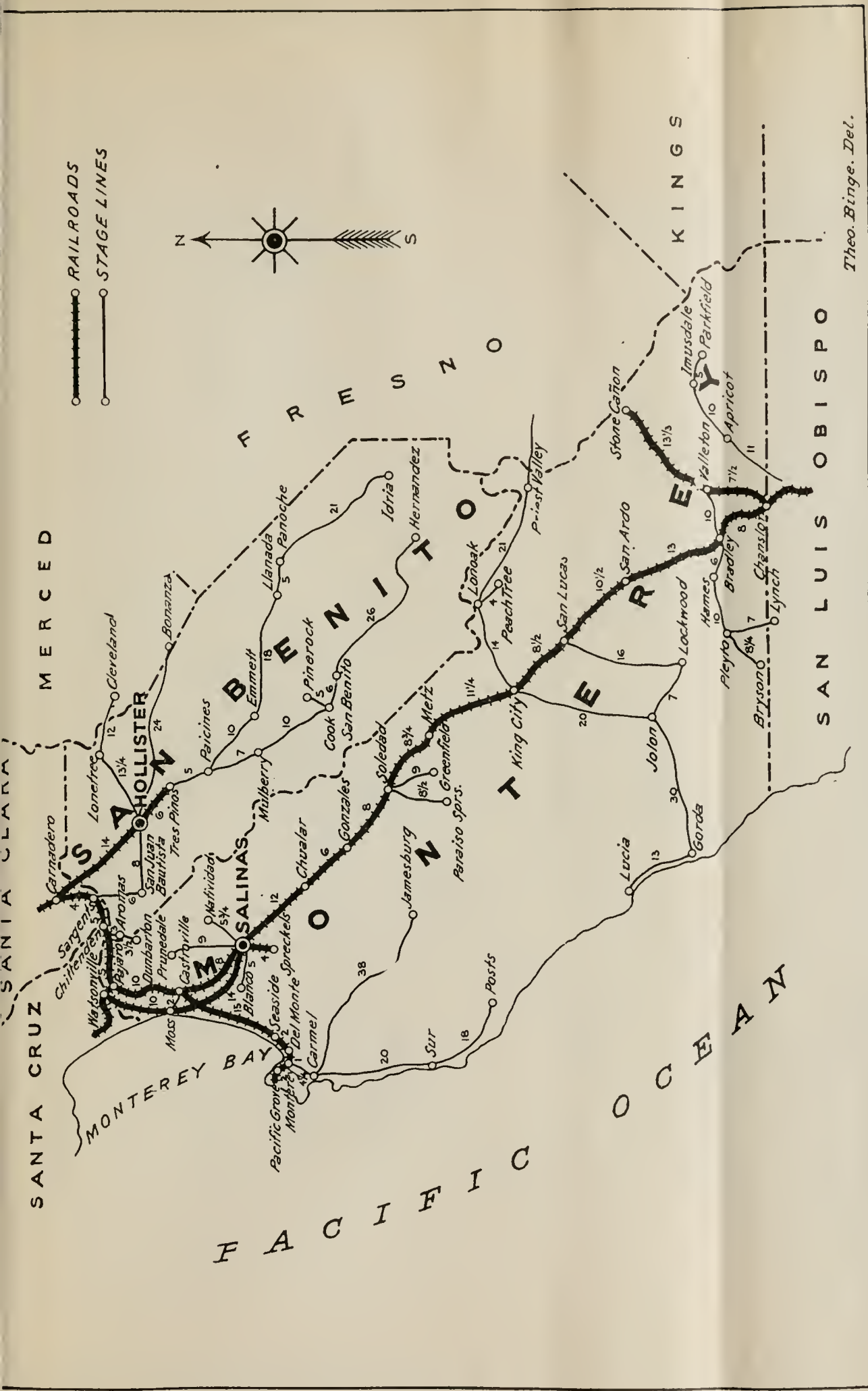
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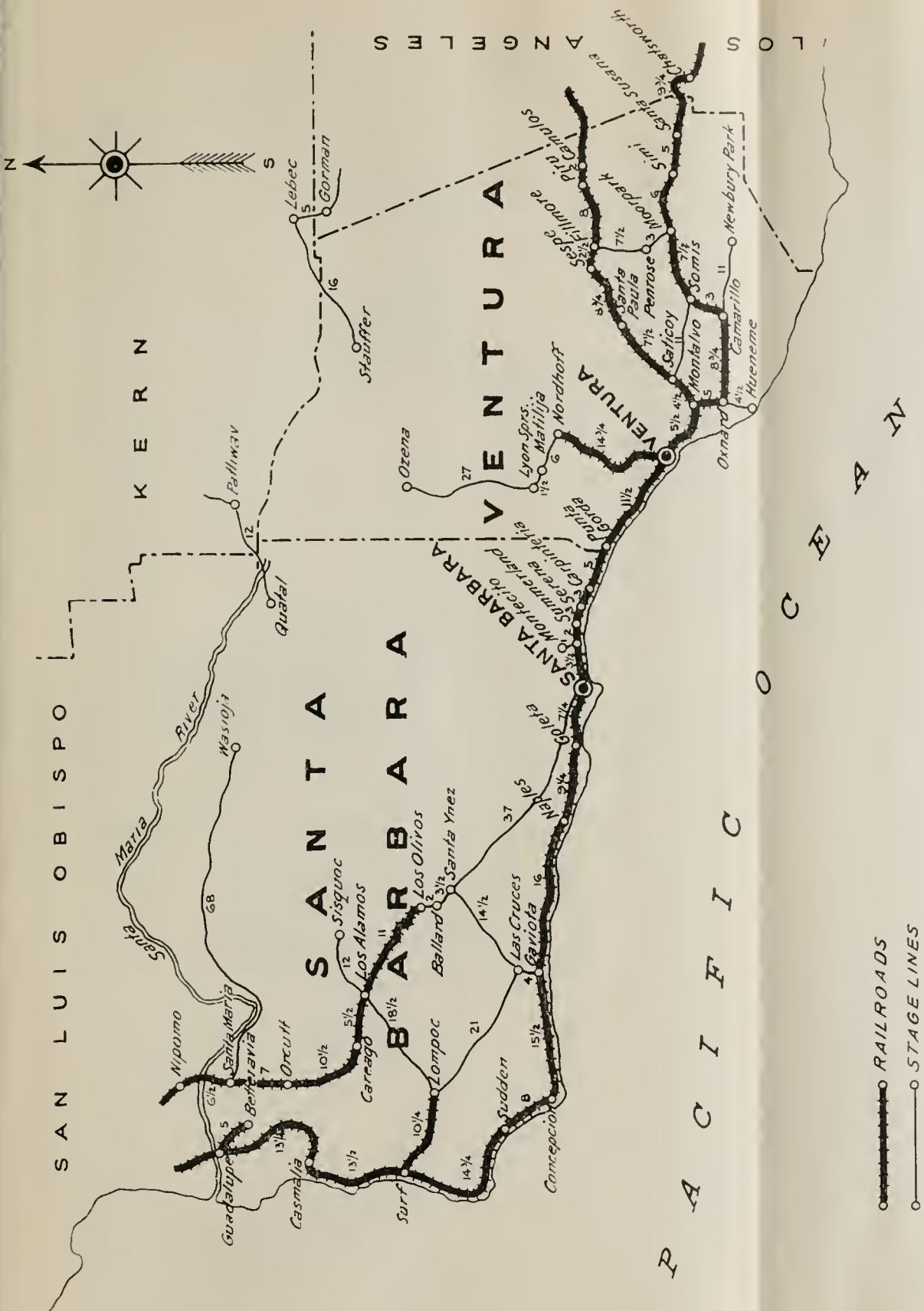


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A detailed map of Santa Barbara County, California, showing the Pacific Ocean coastline, major roads, and numerous towns. The map includes a compass rose in the top left corner. The coastline is marked with towns like San Simeon, San Luis Obispo, and Santa Maria. Major roads are shown with numbers and distances between towns. The map is oriented with North at the top.

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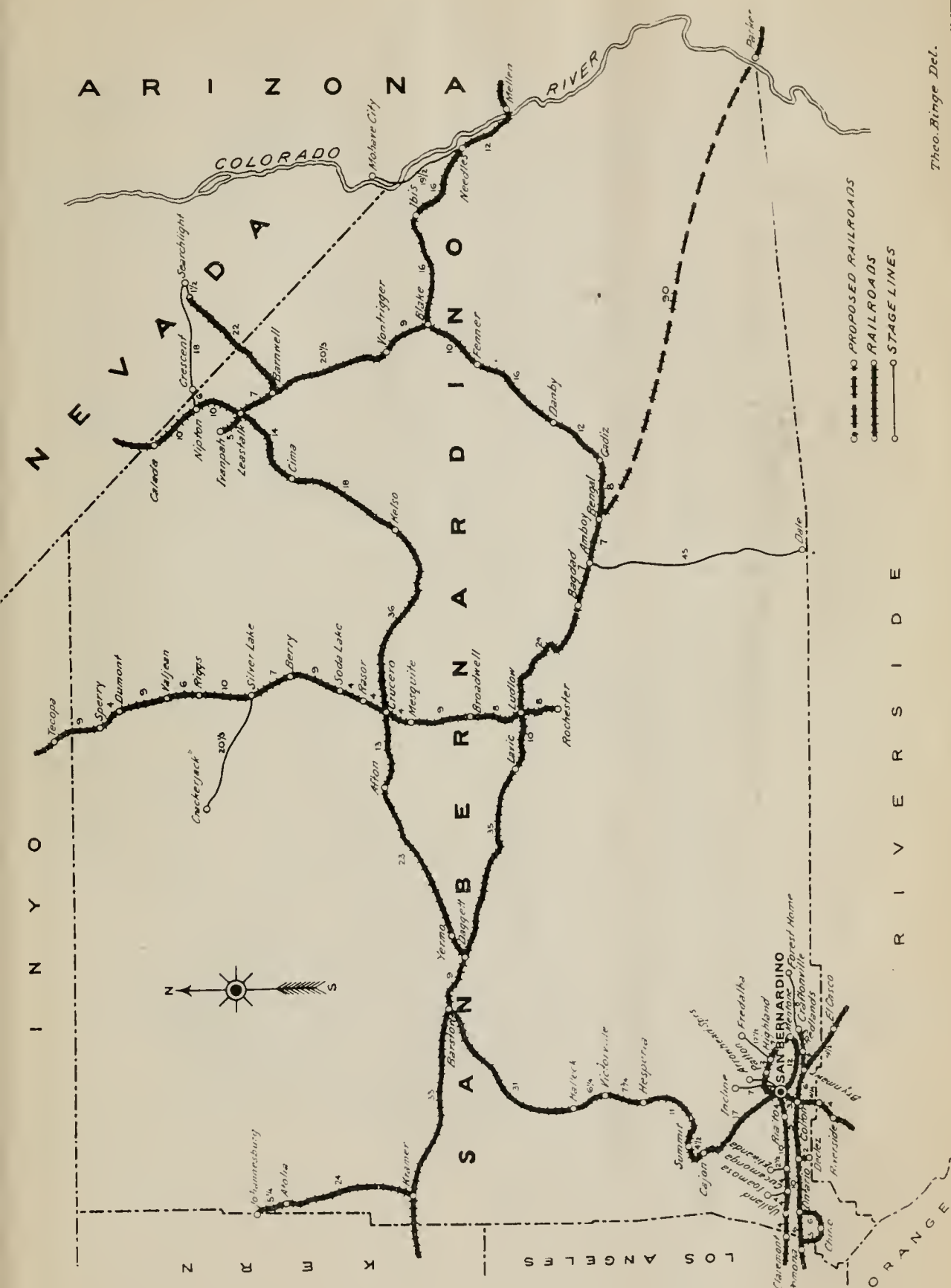
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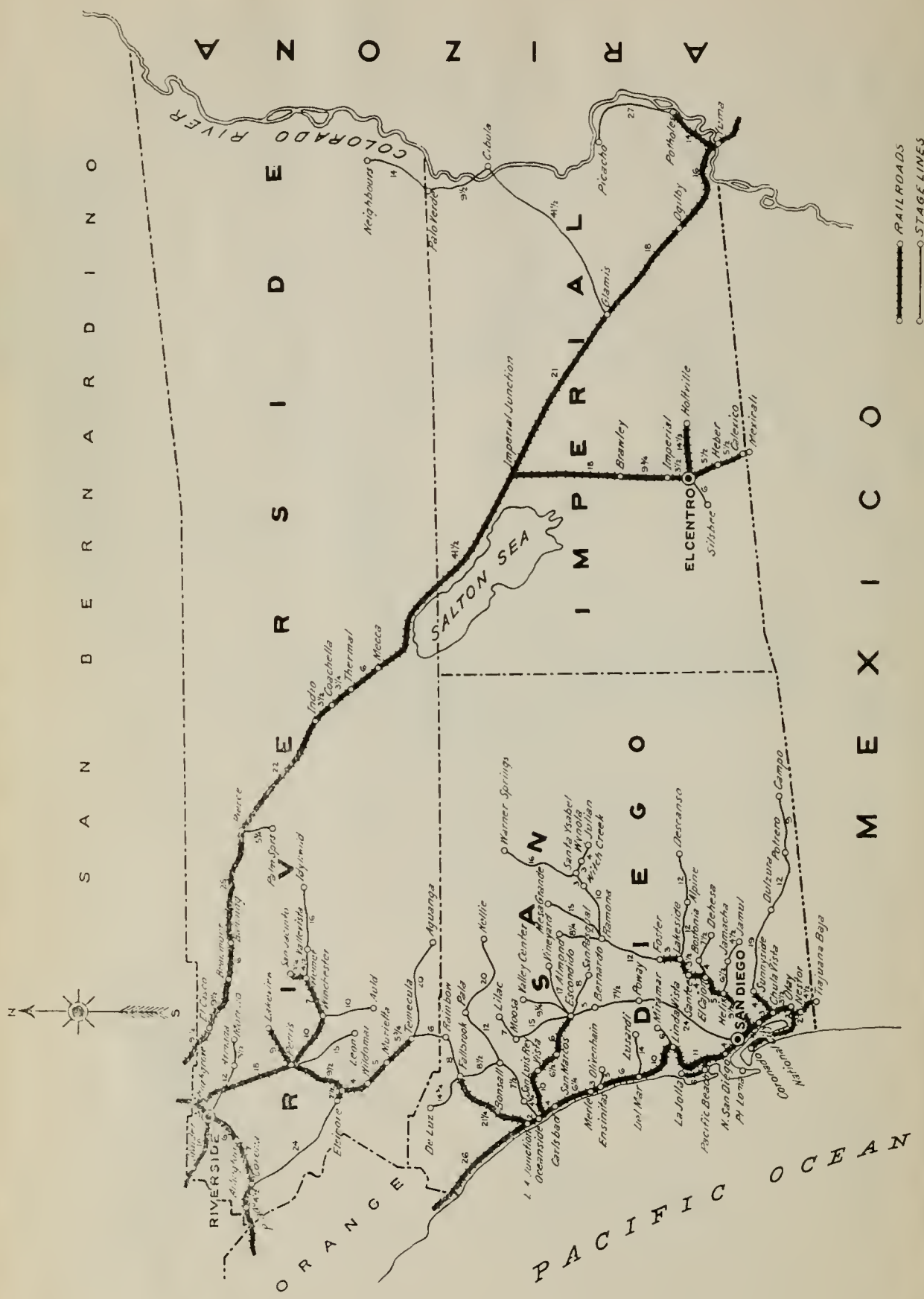
LOS ANGELES AND ORANGE COUNTIES.

RAILROADS
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